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RESIDENTIAL SEGREGATION AND THE GEOGRAPHY OF OPPORTUNITIES: A SPATIAL ANALYSIS OF HETEROGENEITY AND SPILLOVERS IN EDUCATION

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Residential Segregation and the Geography of Opportunities: A Spatial Analysis of Heterogeneity and Spillovers in Education

by

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Dedication

To Francisco, for his endless patience and support,

to my parents, for encouraging me to fly far,

to all the “Juanito Lagunas”, hoping for a better future.

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Residential Segregation and the Geography of Opportunities: A Spatial Analysis of Heterogeneity and Spillovers in Education

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This research estimates the consequences of socioeconomic residential segregation on educational outcomes in the context of the Chilean voucher system used for education. It is found that the combination of school and socioeconomic residential segregation creates challenges to social mobility and social inclusion of the most vulnerable population.

Poverty concentration is understood as the clustering dimension of socioeconomic residential segregation. Its effects are measured by combining quantitative and qualitative methods. Quantitative methods measure the magnitude of two spatial processes: spatial heterogeneity—the contextual differences between neighborhoods—and spatial dependence—by which educational outcomes of one neighborhood depend upon those of adjacent neighborhoods. Spatial processes are tested with multilevel and spatial models implemented in a two step procedure that approximates a hierarchical spatial model. This methodological innovation creates the opportunity for new analytical understanding of the mechanisms driving these spatial processes. A collective case study method of

educational communities in three segregated neighborhoods is applied in order to understand the mechanisms driving these spatial processes.

More than 16% of the variation in 4th graders' math test scores in Santiago is found to be explained by the characteristics of the neighborhood where the school is located. The effects of concentrated poverty are perceived through the actions of certain social mediators. Whether a student lives with both parents and the strength of the family-school bonds are particularly key factors in predicting educational outcomes in poor and segregated areas. Families in these neighborhoods lack exposure to the middle and upper classes' attitude toward education, which is dominant in formal school settings; thus, a strong school-family bond is a way of bridging this difference in attitude. On the other hand, in poor and segregated areas, teacher job satisfaction is negatively associated with test scores. Some schools adjust their expectations downward about their students' potential outcomes; furthermore, some teachers see themselves as successful social workers but with diminished expectations of students' educational outcomes, which explains this negative correlation.

Concentrated poverty affects educational outcomes, but this effect is not deterministic. In fact, some families show successful coping strategies, while others do not. Although further research is needed to explain these differences, this research suggests that the school plays an important role in counterbalancing the negative effects of socioeconomic residential segregation on educational outcomes. Thus, besides neighborhood and school socioeconomic integration, policies aimed at strengthening the mediating role of the school are relevant ways of preventing the negative effects of spatial concentration of poverty on educational outcomes.

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Chapter 1: Introduction

This research explores the consequences of socioeconomic residential segregation on children's educational outcomes in the context of a school-choice and highly segregated educational system. Chile is one of the few countries in the world that has implemented a widespread school voucher system which has lead to important consequences regarding school segregation. The combination of a significant degree of school segregation and the noticeable spatial separation of social groups in the city of Santiago form an ominous scenario for the social inclusion of the most vulnerable population.

This research is aimed at understanding how the social composition of the neighborhood and its surroundings affects educational achievement. The concentration of poverty within and beyond the limits of the neighborhood is associated with fewer and below-standard educational opportunities. Concentrated poverty also facilitates a number of socialization mechanisms that are detrimental to children's learning and educational performance. This research tests the hypothesis that spatial concentration of poverty negatively affects educational outcomes above and beyond the effects of poverty at the household and school levels.

1.1 Problem Statement

Educational attainment is one of the most important predictors of opportunities for advancement later in life. From an ecological perspective, one can argue that educational outcomes are affected not only by individual characteristics, but also by the context in which children live (Broffenbrener, 1986). However, the majority of the literature focuses on the effects of the most proximal environments on the child, such as

the household and the school. For instance, household and school poverty are considered two of the most powerful factors explaining educational outcomes. This research is an attempt to argue that spatial concentration of poverty is an additional and distinguishable important factor in explaining low educational outcomes. In fact, this research explores the idea that spatial concentration of poverty partly explains why school poverty and household poverty are so important for children's educational outcomes. In other words, school and household poverty can be considered as mediators of the effects of neighborhood factors. If spatial concentration of poverty is indeed as powerful a factor as this research claims, the effect of school and parental income on children's education may be considerably weaker than what is commonly thought. This has important policy implications for pursuing the goal of equalizing educational opportunities and outcomes for poor children.

The effects of spatial concentration of poverty on educational achievement work in two main ways, which can be summarized in the concepts of objective and subjective geography of opportunities (Galster and Killen, 1995). On the one hand, concentrated poverty might be associated with fewer and below standard educational opportunities at the local level. On the other hand, concentrated poverty triggers a series of socialization mechanisms that are detrimental to children's learning and educational performance.

1.1.1 Objective Geography of Educational Opportunities and the Voucher System

Since the introduction of the educational voucher during the eighties, primary and secondary education in Chile has been imparted by a three-tier educational system of public, private subsidized, and private non-subsidized schools. In such a system, all children are entitled to a voucher that can be used either in public or private subsidized schools. While the voucher is actually used by roughly 90% of the school-aged

population, there is a small share of children who opt out of the voucher system. The families of these children are able and willing to afford private non-subsidized education that has considerably higher fees.

As expected even by its forerunners (for instance, see Friedman, 1955), the Chilean voucher system has brought about a high degree of school segregation. What is more noticeable and consequential in the Chilean educational system is that school segregation is based on socioeconomic characteristics of the family. There are a number of reasons contributing to socioeconomic school segregation in the Chilean educational system. First, the elite remain outside the voucher system in private non-subsidized schools that, as it will be described in Chapter 4, have significantly higher educational outcomes. Second, since public funds from the voucher are tied to enrollment, it is only rational for private subsidized schools to "capture" the best students in order to increase their school's popularity, and thus its funding. By way of contrast, public schools are legally prohibited from selecting students, which makes these schools more likely to enroll children who, for some reason, do not have access to private education. More often than not, these are poor children. Moreover, due to the increasing supply of private subsidized education, enrollment in public education has decreased,[1] which means that these schools suffer a chronic financial deficit. In fact, since 1997, private subsidized schools have been allowed to charge parents a small fee. Public schools are financially dependent on public funds from the voucher—the real value of which has dramatically diminished over time. Local governments usually contribute to public education within its catchment areas; however, the fact that these schools are generally located in the poorest municipalities contributes to increasing the already high level of educational inequality in the country.

[1] In 2006, enrollment in public education decreased to less than 50%. Until the 80's, public education had accounted for more than 80% of primary and secondary education.

At the same time, residential segregation in Santiago is prevalent and large-scale. Land market dynamics and social housing polices are responsible for a prominent spatial separation of the poor and the affluent from the rest of the society. In fact, social groups in Santiago are spatially concentrated in different parts of the urban area, creating large clusters of the population that are considerably homogeneous in socioeconomic terms.

In the Chilean educational system, socioeconomic residential segregation has been associated with disparate educational opportunities since the voucher educational reform of the 1980's. As it is described in this research, public schools are overrepresented in areas of concentrated poverty, a reality that contrasts with the overrepresentation of private non-subsidized schools in areas of concentrated affluence. In spite of having the capability of choosing a school beyond the boundaries of the neighborhood, not all families are able to move from one neighborhood to another, where the "good" schools are located. Due to high transportation costs and incomplete information, poor families tend to be dependent on educational opportunities that are close to home. In Kain's words (2004), this situation generates the *"worst spatial mismatch of all"*: an uneven geography of educational opportunities that truncates opportunities for advancement later in life, and creates obstacles for upward social mobility among the most vulnerable population.

In this scenario, this research questions market models of education that are "geographically naïve" and socially regressive (Pacione, 1997). Educational systems offering school choice downplay the factor of space and its effects on having equal access to quality education. Thus, in spite of the ability to choose schools outside the boundaries of the neighborhood, residential and school socioeconomic segregation are inextricably intertwined.

1.1.2 Subjective Geography of Opportunities in Segregated Neighborhoods

The effects of concentration of poverty on educational outcomes are not limited to the poor objective geography of opportunities in areas of concentrated poverty. In his seminal work, Wilson (1987) raised another important issue that might have important consequences for children's educability and educational results. Residential segregation is sometimes associated with social isolation, a situation by which residents of segregated areas are less exposed to the standards and opportunities of the mainstream society. Wilson's argument is that nowadays the urban poor, the "truly disadvantaged," are mainly characterized by social isolation. These socially isolated areas typically have a set of characteristics that may have an important effect on children's socialization. Rising unemployment rates for adults, rapid growth of single-parent families, high incarceration rates, a shrinking pool of "marriageable" (economically stable) men and deviant behaviors such as alcoholism, drug addiction, and violence have a profound effect on the normative environment and on the information available for young children.

Besides the availability and quality of local opportunities, this research focuses on the cultural distance between areas of concentrated poverty and mainstream society. This cultural distance holds negative consequences for children's educational outcomes, given that formal education is provided in accordance with the middle and upper classes' standards (Bourdieu, 1977). Children in poor and segregated areas have a cultural disadvantage, since the things they learn in their households and neighborhoods do not always agree with the necessities of formal schooling. Learning becomes difficult in poor and isolated settings, not only because of the low quality of education in those settings but also because socialization mechanisms in these neighborhoods are in direct contrast to the values needed for success in school.

Thus, in order to understand the effects of concentrated poverty on educational outcomes, this research focuses on the quantity and quality of available opportunities and the way in which social mediators such as teachers and families make use of these opportunities. Building a theoretical framework for this research problem, which involves these two seemingly unrelated topics, requires a combined effort from different disciplines, such as urban economics and sociology. This literature helps build a bridge between the structural and cultural characteristics of the neighborhood so that we might understand its effects on children's development and educational achievement.

The effects of concentrated poverty or spatial poverty on educational outcomes can be understood and measured in two related ways. On the one hand, one can argue that educational opportunities and social processes within the boundaries of a particular neighborhood are distinct from the local opportunities and social processes in other neighborhoods. These contextual differences partly explain educational outcomes themselves and also why in certain contexts some individual, household, and school characteristics are more strongly associated with educational outcomes than others. On the other hand, one should recognize that the characteristics of a particular neighborhood are closely related to the characteristics of the surrounding neighborhoods. Thus, educational outcomes in one neighborhood are in fact affected by the characteristics of the surrounding areas. These two spatial processes that help us understand the relationship between spatial poverty and educational outcomes are respectively known in the literature as spatial heterogeneity and spatial dependence. The latter is also known as spatial spillovers or spatial externalities.

1.2 RESEARCH OBJECTIVES

The general objective of this research is to bring space back into the analysis of educational outcomes. In doing so, this research considers both the structural and cultural implications of spatially concentrated poverty in the educational arena.

The analysis tackles four basic issues in understanding and measuring the effects of concentrated poverty on educational outcomes: a) the spatial distribution of the population and the degree of socioeconomic residential segregation in its various dimensions, b) the spatial distribution of educational opportunities, c) the idea that due to a number of observed and unobserved contextual characteristics some factors are more effective in some places than in others, and d) the idea that, since the neighborhood is not a closed compartment but rather an entity that is inextricably related to the surrounding areas, educational outcomes in one place are related to and partly caused by the characteristics of the surrounding areas.

The first objective of this dissertation is to document the level of spatial segregation of the population. Using Census data from 2002 this research describes the spatial distribution of the population and measures socioeconomic residential segregation in the city of Santiago, Chile. Since not all the dimensions of residential segregation are relevant to the characteristics of Latin American cities, the indicators of residential segregation developed in this research account for three of the five dimensions described by Massey and Denton (1988). This research objective focuses on the following questions: How even is the distribution of socioeconomic groups across the urban space? How isolated is the poor population? How clustered is the poor population? Where are the clusters of poverty located?

The second objective of this dissertation is to relate the spatial distribution of social groups across the urban area of Santiago to the spatial distribution of educational

opportunities. In order to do so, schools in the urban area of Santiago are geo-coded and spatially related to the results of the previous objective. This second research objective focuses on the following questions: How even is the distribution of different types of schools across urban space? How clustered in space are schools for the rich and schools for the poor? Is educational performance somehow related to place characteristics such as socioeconomic status?

The third objective is to measure the level of spatial heterogeneity in educational outcomes. In other words, this research is aimed at measuring the importance of the neighborhood context with regard to explaining educational outcomes, once the effects of individual, household, and school factors have been accounted for. In particular, this objective seeks to measure the direct and indirect effects of spatial concentration of poverty on educational achievement. The research questions guiding this objective are: Does socioeconomic residential segregation in urban neighborhoods affect educational outcomes? Is the effect of neighborhood poverty on educational outcomes distinct from the effect of poverty at the household and neighborhood level? What factors are more effective in segregated settings? What factors are less effective in these settings?

As mentioned above, the neighborhood is inextricably related to other adjacent neighborhoods. Connecting the first law of geography—by which "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970)—to the research problem of this dissertation suggests that educational outcomes in one particular neighborhood are significantly related to educational outcomes—or some of their predictors—in neighborhoods nearby. Thus, the fourth objective of this research is to measure the degree to which educational outcomes in a neighborhood—or other characteristics of a neighborhood affecting these outcomes—trickle down to the surrounding areas producing spatial externalities in education. In particular, this research

is aimed at testing the degree to which spatial externalities in education are explained by socioeconomic residential segregation. This objective is guided by the following research questions: Are there educational spillovers between neighborhoods? To what degree are these spatial spillovers explained by the spatial concentration of poverty?

The fifth objective is to provide a formal model for the analysis of the effects of concentration of poverty on educational outcomes. Such a model has to account for the two spatial processes mentioned in objectives three and four: spatial heterogeneity and spatial dependence.

Finally, the sixth objective of this dissertation is to understand the mechanisms that explain why spatial concentration of poverty is important for educational outcomes. In theory, some of the behaviors and attitudes of social mediators in neighborhoods of concentrated poverty affect children's educational outcomes. This objective focuses on the understanding of these mechanisms and pursues the following research question: What are the mechanisms through which spatial heterogeneity and spatial spillovers in education exist?

1.3 CONTRIBUTIONS

This research seeks to make an important contribution to the understanding of educational outcomes of the most vulnerable population. This contribution has theoretical, methodological, and policy repercussions.

This research adopts a multidisciplinary perspective with regard to the theoretical contribution to the understanding of the neighborhood effects on educational outcomes. In doing so, the analysis combines theoretical efforts from urban economics and sociology in order to build a theoretical framework that informs the structural and cultural characteristics of poor and segregated neighborhoods and their effects on educational outcomes. Thus, this research recognizes that the importance of living in neighborhoods of concentrated poverty is not limited to the characteristics of local educational opportunities, but also to the way in which social mediators in these neighborhoods—teachers and families—assess the relevance of these educational opportunities. In theory, this assessment has a direct impact on children's socialization and educational outcomes.

The framework adopted in this research specifically recognizes the role of social mediators in triggering the effects of concentration of poverty on educational outcomes. In doing so, this research seeks to contribute to the theory of neighborhood effects inasmuch as it provides evidence that the effects of concentrated poverty are far from deterministic. On the contrary, neighborhood effects can be offset by these social mediators.

Regarding the methodological contribution, this dissertation combines mapping techniques with quantitative and qualitative methods in order to measure and further understand the nature of the effects of concentrated poverty on educational outcomes.

Mapping techniques are a powerful descriptive method for spatial data that have been seldom used in the social sciences. In terms of the measurement of contextual effects and spatial spillovers in education, this research offers a contribution, since it applies modern spatial econometrics in the field of social sciences. These techniques have been proven to be extremely useful in the analysis of socioeconomic processes that are spatial in nature, and may well provide a fresh perspective to the problem of spatially embedded social inequalities. Furthermore, these techniques are combined with other commonly used quantitative methods in order to build a model that estimates spatial heterogeneity and spatial dependence simultaneously.

The empirical analysis is intended to contribute to the understanding of the social processes affecting educational outcomes in the particular context of a school choice educational system. Chile implemented the voucher system more than 30 years ago, and to the best of my knowledge, no other study has tackled the implications of the resulting school segregation, combined with a high level of residential segregation.

This research is able to distinguish significant neighborhood effects on math test scores from other household and school effects. Several important policy implications can be derived from these findings. On the one hand, the findings highlight the idea that public policies in education will not have the same effect in different settings. The effectiveness of policies and programs aimed at increasing educational outcomes depends on the context in which they are applied. On the other hand, the results of this research suggest that public policies should take into account that to some degree poverty at the household and school levels serves as mediators of the effects of poverty in the broader context. Thus, allocation of resources should adopt a systemic approach that accounts for the fact that effectiveness of the allocation of resources depends on the participation of the entire educational community.

1.4 ORGANIZATION OF THE STUDY

This study is organized into six chapters in addition to this introduction. Chapter 2 provides the main concepts that build a theoretical framework for the analysis of the effects of concentrated poverty on educational outcomes. The chapter starts by defining the concept of residential segregation, its origins, and the relative importance of spatial separation as opposed to social distances. Then the chapter describes the main theories from sociology and urban economics that explain the reasons why concentration of poverty has an impact on children's education.

Chapter 3 describes the main methods used in the analysis. First, the chapter describes the main dimensions of segregation and the main measures used to estimate each dimension. In order to select the one measure that is more useful for this particular research problem, the section makes an attempt to classify these measures into global-local measures and spatial and non-spatial measures. The section also refers to the main problems in the measurement of segregation: the problem of the modifiable areal unit and the problem of varying scales of analysis. In what follows, the chapter provides the main framework for analyzing the consequences of socioeconomic segregation. The methods used in this research are quantitative and qualitative in nature. With regard to the quantitative methods applied in this dissertation, this chapter provides a general overview of multilevel and spatial models used in the quantitative analysis of the neighborhood effects. In relation to the qualitative methods, Chapter 3 briefly describes the collective case study approach adopted for the analysis of the socialization mechanisms affecting educational outcomes.

Chapters 4 through 6 are the main chapters, providing empirical evidence to test the main hypotheses of this research. Chapter 4 provides the main description of the level

of socioeconomic segregation and the distribution of educational opportunities in the city of Santiago. Chapter 5 provides the main results of the quantitative methods used to test for the hypotheses of spatial heterogeneity and spatial dependence in education.

Chapter 6 provides the main findings of the collective case study of three neighborhoods and a number of educational communities within each one of these spatial units. The findings are organized in four main topics that best describe the main characteristics of the socialization mechanisms in segregated areas. First, it provides an overview of the subjective experience of inhabiting segregated areas. Next, the chapter refers to the topics of collective efficacy and school-family closeness. After that, the chapter describes the main findings about available information and the formation of expectations about education. Finally, the chapter describes the main elements of the normative environment in these neighborhoods.

In conclusion, Chapter 7 summarizes the rationale of the analysis and the main findings of the quantitative and qualitative analyses. This chapter also pinpoints some policy implications from the analysis and the research agenda opened up by this dissertation.

Chapter 2: Theoretical Underpinnings: Socioeconomic Segregation and Educational Outcomes

There has been increasing interest in the spatial distribution of the urban population and the social composition of neighborhoods. Socioeconomic residential segregation—the degree to which socioeconomic groups concentrate in urban spaces forming homogeneous clusters of population-is an interesting issue for urban planning and housing policies that focus on the different forces and restrictions driving families' decisions about where to reside. Moreover, the hypothesis that the social composition of the neighborhood—particularly the spatial concentration of poverty—as important consequences for family members, and makes residential segregation a relevant issue for a wider array of social policies.

Several theories have been developed in order to explain the relevance of socioeconomic residential segregation on individuals' life opportunities and outcomes. One school of thought regarding the study of the consequences of socioeconomic segregation argues that homogeneous poverty in the neighborhood is related to having few opportunities at the local level. Thus, people in segregated areas lack access to opportunities because of a spatial mismatch between the place of residence and the location of educational opportunities (Kain, 1968; Galster and Killen, 1995). Another school of thought in the study of the consequences of spatially concentrated poverty argues that the neighborhood triggers a number of socialization mechanisms affecting individual outcomes. This idea has its roots in W.J. Wilson's work (1987) and has been

further developed by the sociological theory of the "neighborhood effects" (Jencks and Mayer, 1990; Brooks-Gunn, 1993).[2]

A number of methodological problems complicate the measurement of the neighborhood effect. Multiple ways of defining and measuring socioeconomic segregation (Massey and Denton, 1988; Sabatini, 2004 among others), the difficulty in defining and measuring the limits of the neighborhood (Kearns and Parkinson, 2001), and the problem of selection bias (Galster, 2003; Sampson, 2001) are some of the difficulties in the research.[3] Nevertheless, the social sciences have dedicated a considerable effort in estimating the magnitude and significance of the contextual effects on several individual outcomes (Jencks and Mayer, 1990). Important efforts to measure the effects of segregation have been developed in the analysis of crime (Sampson and Groves 1989; Sampson and Morenoff, 2002), educational achievement (Mayer, 2002; Ainsworth, 2002), and child development in general (Jencks and Mayer, 1990; Brooks-Gunn et al 1993). Although these authors provide some evidence supporting the hypothesis, it seems that *how* and *why* space matters is still barely understood.

In this chapter there is a discussion of the concept of residential segregation and the importance of space as it relates to social interaction which ultimately affects individual outcomes. Subsequently, the main theories and concepts about the consequences of the spatial concentration of poverty on children's educational outcomes are presented. These elements are integrated in a framework that provides a theoretical basis for the empirical analysis presented in chapters four, five, and six.

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[2] The theory of the neighborhood effects has also been developed in other disciplines, particularly economics. For a review of the theory of neighborhood effects in the different disciplines, see Durlauf, 1996.

[3] For a discussion of these methodological issues, see Chapter 3.

2.1 RESIDENTIAL SEGREGATION

Residential Segregation can be defined as the separation of groups in urban space or "…the degree to which two or more groups live separately from one another, in different parts of the urban environment" (Massey & Denton, 1988 p.282). Until the seminal work of W.J. Wilson (1987), the literature had paid more attention to racial and ethnic segregation while socioeconomic segregation had been set aside (Jargowsky, 1996). In ethnically and racially heterogeneous cities, the correlation between some categories of race/ethnicity and socioeconomic status complicates the identification of the problem of socioeconomic segregation as such, above and beyond the problem of ethnic segregation. While the aboriginal population is significant in some Latin American cities such as La Paz and Lima, cities in the southern cone are fairly racially homogeneous. Although indigenous migration to these cites has increased noticeably during the last decades (Bello and Rangel, 2000) ethnic groups are—for the most part-associated with rural areas. Yet the most obvious division of Latin American urban population occurs with respect to class structure, which highlights the relevance of socioeconomic segregation as compared to racial segregation.

Thus, this research explores the consequences of *socioeconomic* residential segregation: the degree to which socioeconomic groups concentrate in urban space forming socioeconomically homogeneous clusters of population. Socioeconomic segregation isolates the poor from the rest of the society, leading to real consequences for individual outcomes and decisions. Space matters and in order to implement effective policy, we need to understand how and why it matters.

2.1.1 Why does residential segregation exist?

The study of the consequences of socioeconomic residential segregation and the spatial isolation of the poor requires an understanding of its causes. Arguably, voluntary segregation or self-isolation has different consequences than imposed segregation. Self-segregation can be seen as a rational decision, taken after weighing benefits and costs, whereas imposed segregation might carry higher costs than benefits. Thus, it is important to understand how restricted housing alternatives are for the poor.

Economics and the rational choice theory explain residential segregation as part of the assumption that "persons choose the types of people with whom they want to reside" (Borjas, 1998 p. 251) and that a household's choices about where to live are rational, informed decisions. Economic theory suggests that socioeconomic segregation is a household's rational response to the balance between the costs such as taxes, transportation, etc. and the benefits (structure of opportunities, public goods, and services, status, etc.) associated with a particular place in the city. In this fashion, the household can be seen as a "consumer-voter [who] picks the community which best satisfies his preference pattern for public goods" (Tiebout, 1956 p.418). Poor households spatially concentrate because - -under similar budget constraints- they prefer areas with a certain level of tax burden and service provision. Thus, segregation is the rational outcome of individuals' decisions.

One of the most influential works in line with these types of explanations for residential segregation is the bid-rent theory developed by William Alonso (1964). The theory states that households' decisions about where to live are based on the maximization of a budget that combines rent and transportation costs. Longer distances to the city center are associated with higher transportation costs; thus, the higher the amount of money the household needs for transportation, the lower the amount the household is

willing to pay for rent. The bid-rent theory states that households have preferences determined by a set of indifference curves that shape the "bid-rent function". This function represents "the set of prices for land the individual could pay at various distances [from the city center] while deriving a constant level of satisfaction" (Alonso, 1964 p. 59). Each point of this bid price curve reflects the sum that a household is willing to pay for a dwelling, depending on its location and size.

Alonso's bid-rent theory (op. cit) explains why space in the city center is more limited and more expensive than space in the suburbs.[4] The theory also explains why—in the case of U.S. cities—high-income households are usually located in the suburbs. The theory argues that high-income households in metropolitan areas are willing to pay higher transportation costs in exchange for wider spaces that are less expensive in the suburbs. Thus, according to the bid-rent theory, the apparent paradox of disadvantaged minorities living near the city center where land prices are much higher is a rational response to household preferences: as income increases, desire for space also increases and it does so more than the desire for saving in transportation costs.

The distribution of socioeconomic groups as predicted by the bid-rent theory becomes problematic when—as observed by Wilson (1987)—sources of employment start following the middle and upper classes to the suburbs, a migration pattern which leaves low income households in the city center isolated and jobless. In fact, the theory has been unable to explain the creation of an underclass that remains in these isolated and jobless neighborhoods in spite of the increase in transportation costs brought about by this job-flight.[5]

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[4] Assuming that jobs are located mostly around the city center, lower transportation costs make this piece of land attractive. Thus, demand and prices are higher than in the suburbs.

[5] Alonso argues that the creation of multiple business centers dispersed in the suburbs should replicate the bidding process. In this case, one would expect that people in city centers would move to these new business centers in the suburbs, where the jobs are. However, Wilson (1987) observes that this is not the case.

Alonso's theory, that highlights the role of households' preferences in shaping a particular spatial distribution of social groups, does not explain why high levels of segregation often contradict individual preferences for diversity (Zhang, 2004).[6] This suggests that the spatial distribution of socioeconomic groups is driven not only by households' preferences but also by structural constraints.

Alonso's explanation of the spatial distribution of social groups assumes that households have the option of choosing among an array of alternatives, and that decision making is informed and rational. Other explanations suggest that housing decisions are restricted by structural factors. In Marcuse and Van Kempen's words, the "patterns of segregation and concentration change as a consequence of the interaction of household decisions with a variety of structures and development on different spatial levels" (Marcuse and Van Kempen, 2000 p. 5). Similarly, Gilbert (1998) argues that housing consumption in Latin American cities is determined by differentials in income, education, occupation and access to credit. Hence, low-income households are short of affordable housing solutions and tend to be pushed to areas where poverty is likely to concentrate.

In this fashion, the hedonic price theory applied to the housing market (Rosen, 1974) highlights the importance of market imperfections and supply factors on segregation outcomes. This theory states that, on the one hand, willingness to pay for a dwelling reflects a particular preference for a "collection" of attributes such as size, location, infrastructure, and the neighborhood's amenities. The combination of a dwelling's attributes, the resident's income and his tastes determine his willingness to pay for these attributes. Subsequently, low income households show a lower ability to pay for the same amount of attributes than that of middle and upper income groups. On

[6] Using game theory, Schelling (1978) tries to explain this contradiction by arguing that the aggregation of individual motives might generate contradicting aggregate outcomes.

the other hand, suppliers seek to maximize profits by offering different types of dwellings that match the preferences of dissimilar demand functions.

The hedonic price theory holds that the housing market is segmented: there are suppliers for low-income groups and suppliers for high-income groups. If the housing market were perfect, every demand would find a corresponding supply. In practice, however, external frictions cause disparities between supply and demand. If suppliers, for instance, do not know or miscalculate low-income households' demand for housing, they might choose to offer a dwelling that does not match the preferences of the poor (Mayo, 1987). If so, the result is that low-income households lack affordable housing solutions since households from upper classes "raid" housing solutions that are supposed to be for the very poor. According to the World Bank (Mayo & Gross, 1985; Mayo 1987), the level of isolation of the poor is due to the fact that governments and developers have in general overestimated the low-income households' ability to pay for a dwelling. Physical design standards have generally been set at levels higher than appropriate, which generate some leakage of benefits and services to higher-income households..

Rather than being the result of rational households' decisions, socioeconomic residential segregation is mostly related to the restrictions imposed not only by the market but also by public policies on housing. On the one hand, formal housing is expensive and time consuming to acquire and it is often unavailable for a large segment of the population (Gilbert, 1998; Ward, 1988). Urban land prices have been entirely unregulated, which allowed the market to serve out-bidders, not particularly the poor (Sabatini and Arenas, 2000). Low-income households have often found the solution in the informal market. Lack of affordable private housing and poor quality of social housing have brought about a large contingency of households relying on self-help housing located mainly on the peripheries of the cities. The high legitimacy of the

informal economy in Latin American cities reinforces the presence of informal solutions: "The state has generally allowed informality to proceed, and neither *dirigiste* interventions nor widespread public housing provision have come to shape the city fabric" (Ward, 2001 p.1).

On the other hand, public housing, eradication, and gentrification policies have directly or indirectly helped to create clusters of poverty. Often public housing settlements are located in isolated areas which have been detrimental for the spatial integration of the poor. Some housing policies have explicitly contributed to the segregation of the poor. There are, for instance, eradication policies that were implemented during the military dictatorship of A. Pinochet between 1979 and 1985. Eradication policies were aimed at moving thirty thousand Chilean families from the city center and the wealthy suburbs towards the periphery of Santiago. The goal of these policies was to homogenize the city's districts in order to facilitate targeting of social policies (Morales, 1989). In doing so, these types of policies created homogeneous clusters of poverty, physically isolated from the rest of the city and destroyed the existent social networks, which further isolated the poor.

In many Latin American cities, public housing policies and the formation of informal homestead subdivisions in the peripheries have been key elements that contribute to the spatial segregation of the poor. Restricted housing alternatives for the poor have isolated this group from the rest of the society while setting them in the city's periphery, far away from jobs, amenities, and other opportunities.

2.1.2 Spatial segregation and social interaction

Socioeconomic residential segregation has an important spatial component since it refers to the physical distances between groups. The concept of segregation also brings

to mind the degree to which elements belonging to these social groups interact with one another and how spatial propinquity shapes this interaction (Anselin, 2001). In this sense, the underlying assumption that gives substance to the study of the consequences of segregation is that spatial separation prevents "interaction" between groups. In the literature, however, this assumption is only implicit, which generates confusion about the relative relevance of social and spatial distances for interaction between individuals from different social groups.

In fact, segregation brings to mind a much more complex phenomenon than simply the distribution of the population in space. The concept of segregation evokes the kinds of distances that prevent interaction between groups. These distances are social barriers such as cultural differences, religion, ethnic traditions, and historical disputes between communities. These distances are so important that many authors (Sabatini, 2004; Reardon and Firebaugh, 2002, Arriagada and Rodriguez, 2003) recognize that, strictly speaking, nothing guarantees that potential contact coming from spatial propinquity is not hindered by these social and cultural barriers.

White (1983) describes the difference between social and geographical segregation. He claims that "…in one sense—the sociological- segregation may mean the absence of interaction among social groups. In another sense—the geographical-segregation may mean an unevenness in the distribution of social groups across physical space" (op cit p.1009). In his distinction between spatial and physical distances, White places the concept of interaction in the sociological aspect of propinquity and sets the importance of space in the idea that people with whom one shares space affect the experience of urban life.

The distinction between social and spatial separation of groups brings about a complex definition that includes both aspects of segregation. This way, Reardon and

Firebaugh (2002) define segregation as "a concern with the social distance between members of different groups […] based on spatial locations, social institutions—such as schools, organizations, or occupations- social networks, or other aspects of the social terrain" (op cit p.85). Together with White (1983) Reardon and Firebaugh realize that interaction among social groups has many causes besides physical distances. In doing so, the authors give a twist to the definition of segregation by claiming that it refers to the probability of interaction between different groups where interaction depends upon social distances between subjects who are attached to a particular space.

The analytic unification of social and spatial distances tends to confound the definition of the problem of segregation with its consequences, which results in methodological and theoretical problems. On the one hand, the relationship between physical and sociocultural distances varies between societies (Arriagada and Rodriguez, 2003). In a caste society for instance, social segregation may well be absolute even if spatial segregation is minimal (White, 1983). Many times, however, physical distance is indeed correlated to social distance. Children in a playground interact because they happen to be sharing the same space. Thus, since the relationship between social and physical distances is not constant, it is extremely complex to generate a measure of segregation that comprehends both spatial and social distances.

On the other hand, the conception that -under certain circumstances- space is not relevant for interaction (Arriagada and Rodriguez, 2003)—such as in the case of a caste society or the historical Jewish/Palestine dispute—reflects a vacuum in the literature about the relevance of spatial separation as opposed to social separation of groups. First, this conception challenges the ecological perspective, in which space is conceived as more than the scenario in which people interact (Gotham, 2003). Secondly, it restricts the

concept of interaction to those interactions that are more likely to occur under social propinquity. I will refer to these issues in turn.

According to the ecological perspective, space is not merely a container of individual action. Space is a "social construction that shapes social action and guides behavior" (Gotham, 2003 p.723). Space is a social construction because its material characteristics and meanings are the product of social relations. For instance, a particular neighborhood is identified as such because inhabitants recognize themselves as occupying a particular place with particular characteristics, while identifying others as inhabiting other places with other characteristics. In this sense, space is not something dead, external, or unmanageable; on the contrary, "spatial boundaries, identities, and meanings are negotiated, defined, and produced through social interaction, social conflict, and struggles between different groups" (op cit p. 723).

Physical space shapes social action inasmuch as it situates actors in a material reality that makes sense in relation to other actors' material reality. The relative material situation of actors that is often embedded in the space they inhabit, affects the way in which people relate to one another (Gottdiener, 1994). Therefore, the particular importance of the physical space in which people live rests in the belief that—being a consequence and a cause of social interaction—it affects the way individuals behave. Space is said to affect human agency—or people's perception of their ability to shape their own lives—inasmuch as the characteristics of the physical environment affect the way in which people feel and behave about the way in which they occupy a particular space. In this fashion, George Simmel (1950) in his "Metropolis of Mental Life", gives an example of how the characteristics of urban and rural spaces affect the ways in which people behave.

Socioeconomic segregation can be seen as a cause and consequence of having few local opportunities, a feeling of being isolated from the mainstream, and the inability to materialize aspirations for social mobility through institutionalized manners (Kaztman, 2001). In this way, spatial separation acts as a structural constraint that affects an individual's perception of his/her capacity to affect his/her own future.

The second theoretical problem that arises from the attempt to confound social and spatial separation of groups is that such a complex concept restricts the idea of social interaction to the one that is more likely to occur under social proximity.

Physical and social proximity might mirror different types of contact between groups. For instance, the fact that in a caste society spatial proximity is not relevant, because no matter how close groups are in space they are still socially separated reflects an underlying assumption: that the idea of "interaction" is being restricted to cooperative, face-to-face relationships that are more likely to come from social proximity. In fact, other forms of interaction affecting human behavior such as functional business-like relationships, awareness of the existence of other groups, and even social tensions between groups are valid forms of interaction that shape human behavior and reproduce social structures, social action, and relations of power and resistance (Gotham, 2003). In part, a caste society survives throughout time because one caste is aware of the other and because spatial proximity facilitates the reproduction of this awareness from one generation to the next.

A particular spatial distribution of the population—regardless of the social separation between groups—reveals a particular form of interaction between social groups. This research takes the underlying idea that spatial separation reduces interaction among groups over space (Newby, 1982) and argues that spatial propinquity affects interaction between groups. When the spatial distribution of the population changes,

forms of interaction also change, which may well affect social outcomes. For instance, in the city of Santiago, Salcedo and Torres (2004) provide evidence of increasing connections between socioeconomic groups after the development of gated communities for the middle classes in poor districts. This study shows that, by decreasing the physical distance between low and middle-high income groups, gated communities have created new functional employer- employee relationships—mostly in domestic labor. Residents declare that spatial nearness has brought about an increasing awareness of other groups that has permitted each group to break with historic prejudices that they have historically held about each other (Salcedo and Torres, op cit).

2.2 CONCENTRATION OF POVERTY AND EDUCATIONAL OUTCOMES

It is commonly acknowledged that educational attainment is one of the most important predictors of opportunities for social mobility later in life (Hobcraft, 1998); then again, numerous studies have shown the detrimental effect of poverty on children's educational outcomes (Coleman, 1966; Bourdieu and Passeron, 1977). Poverty negatively affects educational attainment, which in turn is a precursor for social mobility. Thus, social policies aimed at diminishing poverty levels in the long run need to have a good grip on how poverty presents an obstacle to making the most of the schooling years.

Ecological models of child development (Bronfrenbrenner, 1986) assume that individuals cannot be studied without considering the context in which they operate. According to this approach, educational outcomes depend upon individual characteristics such as intelligence, and upon other elements that characterize the proximal and distal contexts in which children live. Poverty is one of these characteristics. However, poverty can be experienced on many levels: children might experience poverty in the household, at school, in the neighborhood, or in all of these contexts at the same time. In practice,

research has focused mostly on the effect of poverty in the most proximal environments such as school, family and peers, while the neighborhood context has been less explored and certainly less understood (Brooks- Gunn et. al, 1993).

The increasing awareness about the effect of neighborhood characteristics on children's development and their learning process has called attention to the fact that the causal link between household and school poverty and low educational outcomes may be considerably weaker than what is commonly thought (Mayer, 1997). Low income parents may differ from middle or high income parents in factors such as social adjustment, skills, enthusiasm, dependability and hard work (Brooks- Gunn, 1997). The possibility that these differentials are actually caused by contextual differences such as neighborhood deprivation and isolation suggests that increasing poor parents' income is not a sufficient solution in order to improve educational outcomes among poor children. Similarly, teachers from schools in segregated areas may differ from teachers from schools in middle and high income schools. While neighborhood deprivation may have something to do with this difference, increasing a school's resources while disregarding the importance of the neighborhood might not be an effective policy either.

Concentration of poverty in the neighborhood affects educational outcomes of children, impeding their social mobility and perpetuating poverty from one generation to the next. Connell (1995) developed a general analytical framework in order to understand the way in which the neighborhood context affects children's development and learning process. This model takes into account the characteristics of the environment in which children develop by positioning the effect of the neighborhood's characteristics on children's outcomes in relation to household and individual characteristics. In a nutshell, Connell's model suggests that individual outcomes are affected by a number of aspects of

the community,[7] effects that are mediated by social actors and the individual's developmental process itself.[8]

Connell (op cit) identifies four interrelated features of the community that influence children's development and subsequent educational outcomes. These elements can be physical /observable such as physical conditions, demographic characteristics of the population and the local economic structure of opportunities, or they can be symbolic, such as social exchange and institutional capacities.

The effects of these characteristics of the community on children's development are processed through social mediators or micro-systems (Bronfrenbrenner, 1986) such as parents, other adults in the neighborhood, and peers. On the one hand, parents and other caregivers intervene in children's development by providing supervision that becomes critical when community conditions are less than optimal (Jarrett, 1993). Neighborhood conditions affect their young members, but this effect can be counterbalanced by the family. However, neighborhood and family effects are not independent from one another. After all, parents are also immersed within the neighborhood context and are affected by it. In fact, Connell reckons that so far "the research is less directive about the exact relationship between community dimensions and specific aspects of caregivers' support for youth" (op cit p.101). On the other hand, peers -close friends, classmates, neighborhood chums, and the like- mimic one another, creating a behavioral contagion effect (Jenks and Mayer, 1990). Even if children are not in direct contact with one

[7] The authors refer to "the community" as the contextual unit of analysis. I use the words "community" and "neighborhood" as synonymous; nonetheless, this is not necessarily the case. For a deeper treatment of this issue, see Chapter 3.

[8] The authors note that the influences and relationships between community dimensions, social mediators, developmental processes and desired outcomes form a two way street. However, they present the analytical framework as "purposefully unidirectional" because the focus of the framework is on explaining the outcomes (Connell et al op cit p. 95).

another, peers affect children's development since they compete for resources, which are rather scarce in segregated areas (Connell et al, 1995).

Connell's general framework introduces the elements that link the neighborhood characteristics to children's development in general and to educational outcomes in particular. The main theories about the consequences of the concentration of poverty in the neighborhood can be classified into two groups. The first one comes mainly from the field of Sociology and focuses on the symbolic aspects of the community that enable a number of socialization mechanisms affecting an individual's development and decision making. This line of thought has its roots in the seminal work of William Julius Wilson (1987) and is adapted to children's development by the work of Jencks and Mayer (1990), Mayer (2002) and Brooks-Gunn (1993) among others. The second line of study is developed by labor and urban economics and focuses on Connell's (op cit) observable aspects of the community. It argues that homogeneous poverty in the neighborhood goes along with few opportunities at the local level. Accordingly, people in segregated areas lack access to opportunities because location of residence and location of opportunities are spatially mismatched (Kain, 1968).

As Connell et al recognize—yet, they are not able to specify- the elements of the community affecting children's development are related to one another. The structure of opportunities in the neighborhood is related to the socialization mechanisms taking place within it. Similarly, symbolic elements of the neighborhood such as norms and social exchange affect the way in which people evaluate the structure of opportunities in the neighborhood. This subjective way to assess opportunities restricts the set of opportunities actually available in the community (Galster and Killen, 1995). In what follows, I describe the main theories explaining the effects of concentration of poverty on educational outcomes.

2.2.2 Contributions from Sociology

The characteristics of the neighborhood -such as concentrated poverty- are the keystone of the particular socialization process that takes place within the community. This process explains the neighborhood effects on educational outcomes.

There are two hypotheses about the effects of concentrated poverty on children's educational attainment (Jencks and Mayer, 1990). The first group of models considers that concentration of poverty has negative effects on educational outcomes, whereas the second hypothesis suggests the opposite: that neighborhood heterogeneity, being poor and sharing the neighborhood with non-poor families, is detrimental to educational achievement.

The literature ascribing to the hypothesis that negatively assesses contextual poverty identifies three mechanisms through which concentration of poverty harms educational attainment: contagion, collective socialization, and institutional socialization (Jencks and Mayer, op cit).

Following Connell's (op cit) general model, the "epidemic" hypothesis asserts that one of the most important determinants of children's behavior and outcomes is peers' influence. Deprived neighborhoods concentrate behavioral problems that spread among children. Truancy, disruptive behavior in the classroom, and low educational achievement are common in poor neighborhoods because 'like begets like' (Brooks Gunn, 1993).

Models of collective socialization assert that adults in a neighborhood influence youth since they are role models for children (Sampson et al, 1999). Isolation and segregation bring about joblessness among adults (Wilson, 1987) which generates a poor

system of concrete expectations and goals, and yields the result that children growing up in such a system do not learn the culture of work (Willis, 1977).

The models of collective socialization also focus on the supervising role of adults and the level of intergenerational closure or the degree to which adults and children in the community are linked to one another (Sampson et al, 1999). For instance, adults looking out for children enable what Sampson (op cit) calls collective efficacy for children,[9] a concept that refers to shared expectations and mutual engagement by adults in the active support and social control of children. In the end, it is the neighborhood's social capital (Coleman, 1990)[10] that is the key element that explains and sustains collective efficiency for children; sources of social capital tied to local community context are analytically distinct from -and may be no less consequential than- the more proximate relationships observed inside the home. In this sense, "… concentrated disadvantage […] is associated with sharply lower expectations for shared child control" (Sampson et al, 1999 p.633), which makes the environment less conducive to learning.

Finally, the literature refers to the models of institutional socialization. Connell (op cit) warns about the importance of institutional capacities in the community. By capacity, he means both financial and human resources. Poor areas may lack the former, since they mostly depend upon local tax revenue. In addition, the way in which teachers and other adults from outside the community perceive the neighborhood conditions often limits the supply of adults who are willing to work in local institutions. The institutional socialization hypothesis focuses on the effects that these adults from outside the neighborhood have on children's behavior (Jenks and Mayer, 1990).

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[9] Collective efficacy is defined as "cohesion among residents combined with the shared expectations for the social control of public space and their willingness to intervene on behalf of the common good (Sampson and Raudenbush 1999, Sampson et al 1997).

[10] Social Capital is a form of organization that arises when people form a structure of relations that facilitates action "making possible the achievement of certain ends that in its absence would not be possible" (Coleman, 1990 p. 300)

Adults from outside the community, such as teachers, principals, and public officials enter the isolated neighborhood through institutions. One of the ways in which these adults affect children's lives is through what Rosenthal and Jacobson (1992) call the "Pygmalion phenomenon". Simply put, when teachers expect students to show intellectual growth and have sound educational outcomes, students do; when teachers expect the opposite, the opposite happens because performance and growth is not encouraged—and is often discouraged. In this sense, neighborhood effects operate by means of the way in which institutional practices judge the capabilities of the youth (Bauder, 2001). In Bauder's words, "local institutions use labels of 'dysfunctionality', based on an interpretation of the cultural attributes of their clients and service area to assess career potential" (op cit p.594). Thus, teachers consider residence as a determinant of functionality. Poor children in segregated areas will often be considered 'dysfunctional' for college education and will be socialized as such, whereas poor children in integrated neighborhoods will be pushed to keep up with the community's expectations.

In contrast, the literature identifies a group of models that asserts that concentration of poverty—as opposed to socioeconomic heterogeneity in the neighborhood- does not have negative effects on educational outcomes. The main approach sustaining that neighborhood homogeneity or segregation benefits educational outcomes is the relative deprivation hypothesis.

Relative deprivation models assume that people judge their success or failure by comparing themselves with others around them. Heterogeneity or integration lifts the "veil of ignorance" under which "…no one knows his place in society, his class position or social status; nor does he know his fortune in the distribution of natural assets and abilities, his intelligence and strength, and the like" (Rawls, 1971 p.35). Applying Rawls' argument (op cit) to the research problem of this dissertation suggests that spatial

separation of social groups helps in hiding social inequalities. Thus, since children judge their academic success by comparing their school performance with that of their peers, they will have a better concept of their own academic abilities if they are surrounded by similar children. Educational outcomes are not negatively affected by segregation, because social isolation keeps children's self-esteem high.

Although many research projects fail to show the detrimental effects of concentrated poverty on educational outcomes (see Jencks and Mayer, 1990) this is seldom interpreted as evidence for the relative deprivation hypothesis. Knies et al (2007), attempt to prove the relative deprivation hypothesis by means of the following idea: individuals should be happier the better their relative income position in the neighborhood is. These authors do not find evidence of this hypothesis.

2.2.1 Contributions from Labor and Urban Economics

Jencks and Mayer's review (1990) suggests that empirical evidence is not strong enough to conclude that people in segregated American neighborhoods—inner cities- have fewer opportunities—locally or extra-locally- than people in the suburbs. Thus, the neighborhood matters, due to the socialization processes within it. In his research, Kain (1968, 2004) develops the opposite argument through the concept of "spatial mismatch". In its origins, the concept states that since minorities are constrained in their choices of residence, they have to "trade-off a higher probability of employment […] against higher transport costs" (Kain, 2004, p.10). This spatial mismatch in the labor market would explain the relatively high unemployment rates among minorities living in the inner city, as compared to minorities anywhere else.

Later, Kain (2004) expands the concept of spatial mismatch beyond the opportunities associated with the labor market, to include other limitations associated

with the restricted residential choices of minorities, such as educational opportunities. He calls this 'the most serious type of spatial mismatch that currently exists in U.S. metropolitan areas, the intense concentration of [minority] children in low-achieving inner city schools" (Kain op cit, p.21). In his words, the problem in today's education system is that minority children attend low-quality schools mostly with other minority children. Thus, Kain pinpoints two problems associated with residential segregation and educational outcomes: the low quality of schools in poor neighborhoods and the peer effects arising from the limited array of educational opportunities in the neighborhood. Although Kain recognized that the evidence about peer effects on educational outcomes is mixed (Kain and O'Brien, 1998; Kain and O'Brien 2000; Hanusheck, Kain and Rivkin, 2002) he asserts that the problems of "ghetto education" will not be defeated until minority children have wide access to high quality schools where "the majority of the students come from middle and upper income families" (Kain op cit, p.24).

Kain raises the question about the relationship between school segregation and residential segregation. In a school system that is financially decentralized and spatially organized around districts, school segregation is the logical consequence of residential segregation (Nechyba, 2003). In Denton's words "…school segregation and residential segregation are inextricably entwined. This connection is grounded in the preeminence of the concept of 'neighborhood schools' in the United States" (1996, p. 795). Assuming that most children are enrolled in their 'neighborhood school', the link between school and residential segregation is relatively easy to explain. In this case, school segregation is a function of residential segregation. In a study about the British educational system Fitz et al (2002) argue that catchment areas -the most commonly used criterion in the allocation of students to places in the UK- creates and sustains socioeconomically segregated patterns of schooling, because these are linked to residential segregation.

The relationship between residential segregation and school segregation differs according to the nature of the educational system. Educational systems where school choice is not restricted to local schools might show a different pattern in the relationship between school and residential segregation. In fact, private provision of education and the assumption that parents should be free to choose the school they prefer, breaks the obvious relationship between these two forms of group separation. The presence of private schools opens up the possibility for social groups to be able to reside in the same neighborhood without having to choose the same school. Private schools also open up the possibility for students from different parts of the city to meet in the classroom. A school system that provides parents the ability to choose the school they prefer regardless of its location makes the link between school and residential segregation more equivocal. In such a system school segregation is not linked in and of itself to the level of segregation in the neighborhood; the link between one and the other is contingent upon the unequal distribution of opportunities—what Kain (op cit) calls spatial mismatch—and prohibitive transportation costs that prevent poor families from commuting to distant neighborhoods in search for better educational opportunities.

2.3 VOUCHER SYSTEM AND THE GEOGRAPHY OF OPPORTUNITIES

One of the most emblematic examples of a school choice system that follows a market model of education is the "voucher" system. A voucher in education is a type of demand-oriented subsidy attributed to Milton Friedman (1955, 1962). The voucher system seeks to reinforce the private sector in the provision of education, inasmuch as the voucher entitles private schools to receive public funding.

One of the main characteristics of the voucher system in education is that the subsidy or voucher "follows the student". In this system, each child is entitled to a

voucher that can be used in any school that accepts the voucher as a valid form of payment. Since the voucher belongs to the students, if children leave the school, the funds leave as well. As a result, schools have incentives to attract and retain students in order to receive and retain funding. Since the number of students is limited, vouchers supposedly encourage competition among schools. In this sense, the voucher system considers schools as profit-maximizing firms in the sense that "competition forces schools to see each other as rivals striving to gain the advantage that will secure survival" (Ranson, 1993 p.272). In the voucher system, the advantage that Ranson (op cit) is referring to is, in the end, the student, since students carry a voucher that in turn secures school survival.

Theoretically, the voucher system sees competition as the main mechanism boosting quality of education (Friedman, 1955). In a voucher system, the existence of economies of scale guarantees that the larger the enrollment the higher the profits. Good schools attract students by offering a good quality education and, in doing so, maximize profits. Then again, it is not only the size of the class that ensures high profits, but also the quality of the students that the school is able to recruit. Recognizing that education does not cost the same for every student, profit-maximizing schools have good reasons to engage in a selection process in order to attract those students who are less expensive to educate. In doing so, schools maximize the net value of the voucher (Sapelli, 2003).[11]

From the supply side, vouchers facilitate the creation of a two-tier system: some schools can afford to select the most suitable pupils whereas other schools often have "empty desks" that will accommodate those children who are excluded from the “good” schools (Adler et al, 1989). From the demand side, Friedman (op cit) argues that rational

[11] In its origins, the system would provide a lump-sum kind of voucher. This is a voucher of equal value to all children, regardless their characteristics such as race, ethnicity, socioeconomic status, and other factors affecting the cost of the student’s education.

and well-informed parents want a good quality education that is best suited to their preferences in relation to extra-curricular activities. In a system where all schools have the same curriculum and are equally subsidized, parents would choose schools according to school performance and other extra-curricular characteristics. Thus, an educational system as such requires that parents have free access to information about school performance through league tables or report cards. In practice this is not always the case, which creates information asymmetries between informed and uninformed parents (Fitz et al, 2002). The existence of informational asymmetries is one of the reasons that explain self-selection of families in different types of schools. Even in the absence of information asymmetries, it is likely that parents' extra-curricular preferences are correlated to socioeconomic status, race, or ethnicity; hence, informed parental choice might also help to segregate schools (Williams and Echols, 1992).

As a result, a voucher system encourages schools to select children while allowing parents to choose the school they prefer. The schools' and parents' ability to choose leads to school segregation that is only aggravated by the spatial segregation of the population. On the one hand, it is reasonable for schools to establish themselves at a location near the children they want to educate. It was mentioned before that, in order to maximize the net value of the voucher, the schools have incentives to choose children who are less expensive to educate. The socioeconomic status of the household is one of the main indicators of how well-prepared children are for the formal school system. Thus, the rational outcome in an unregulated setting is that poor and segregated neighborhoods will have fewer education opportunities than more affluent ones do. On the other hand, residential segregation leaves poor families in isolation, without access to information, which is crucial for choosing schools.[12] An important conclusion is that market-based

[12] Arguably, one of the ways in which parents evaluate schools is by comparing them to other schools. Comparison can be done based on report cards or other informal mechanisms such as shared experiences

education policy has underrated the importance of geography. As Pacione puts it, “A fundamental deficiency of the market model of education is that it is geographically naïve and socially regressive. It does not and cannot address adequately the difficulties of those people and places disadvantaged by the operation of the market" (Pacione, 1977, p. 172). While better-off families can afford to travel longer distances if their preferred school is outside the neighborhood, poor families in segregated neighborhoods are limited to the opportunities within the neighborhood.

2.4 A UNIFIED THEORY OF THE EFFECTS OF SPATIAL CONCENTRATION OF POVERTY ON EDUCATIONAL OUTCOMES

Connell’s model (op cit) about the contextual effects on youth development suggests that spatially concentrated poverty is important in influencing educational outcomes because certain structural and social elements in these types of communities affect people’s decisions and outcomes. Moreover, the model underscores the importance of social mediators, since their behavior would trigger these “neighborhood effects”. As explained above, urban economics—through the theory of spatial mismatch in education (Kain, 2004) and the theory of the geography of opportunities (Galster and Killen, 1995)—has emphasized the importance of the structural characteristics of the neighborhoods, i.e. the quantity and quality of local educational opportunities. In contrast, sociological theories highlight the importance of social—or, in Connell’s words, symbolic—elements of the community that affect children’s development and their learning process. These symbolic elements determine whether children acquire attitudes, values and norms that lead to successful educational achievement. Moreover, sociological

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with other parents. Poor families find themselves without alternatives to compare, since the neighborhood has few schools with similar characteristics and, most importantly, because other parents in the family network access the same type of schools.

theories suggest that the acquisition of these attitudes, values, and norms is driven by the behavior of social mediators in the community: parents and other adults, teachers and other adults in the school, and peers.

Combining the theoretical elements of the community—structural and social or symbolic—that explain its effects on youth development allows the construction of a unified theory that a) seeks to explain why spatial concentration of poverty influences educational outcomes, and b) emphasizes the role of social mediators. This unified theory suggests that both structural and social elements of the community trigger certain attitudes and behaviors among these social mediators that, in turn, affect children's acquisition of attitudes and behaviors toward school and ultimately educational outcomes.

This theory stresses the importance of two structural and two social elements in the community that are critical for the behavior of social mediators and therefore for children's acquisition of attitudes, norms, and values that lead to a successful academic path. These elements incorporate the main ideas of the theories of the neighborhood effects from urban economics and from sociology, as presented above. The social elements are the availability of information and the normative structure of the community. The structural elements refer to the availability of opportunities and institutional capacities at the local level. Although the effects of these social and structural elements are related in many ways, each of them has a particular effect on the attitudes and behaviors of social mediators. In the following discussion, I refer to these four elements in turn.

2.4.1 Effects of Social Elements in the Neighborhood

In this research, I identify two main social elements that affect attitudes and behaviors of social mediators and of children themselves: available information and the local normative structure.

Available information in the neighborhood is one of the critical elements that shape children's socialization process and the acquisition of attitudes and behaviors towards school. Sutherland's (1973) differential association theory suggests that a particular behavior is learned by interacting and communicating with other people.[13] In this interaction, individuals are exposed to information that is learned and used as a behavioral guide (Burgess and Akers, 1966). As suggested in the first part of this chapter, spatial concentration of poverty means that interaction with other social groups becomes more difficult. Given the social isolation of inhabitants of spatially segregated areas, information is provided by communicating and interacting with people within the community. This is the reason why information becomes so important in areas of concentrated poverty.

Sociological theories suggest that there are two main sources of information in the community: peers and role models. In fact, Connell (1995), Jencks, and Mayer (1990), and others have stated that information is readily available in the peer group. Thus, peer effects can be identified as one of the socialization mechanisms emerging from the available information in the neighborhood. According to Sutherland's (op cit) differential association theory, communities where certain activities such as idleness, dropping out of school, and truancy are common make children more likely to take part in such activities.

[13] Sutherland's theory is in accordance with a social behaviorist approach that emphasizes the "reciprocal interaction between cognitive, behavioral, and environmental determinants" (Bandura, 1977, p.vii). In particular, the theory seeks to explain criminal behavior, but it can be extended to explain other behaviors such as discipline at school, etc.

In these types of communities, children who spend more unsupervised time with their peers will have a higher likelihood of developing behaviors that are dysfunctional for the learning process. Thus, since they provide important information, peers have a critical effect on youth's acquisition of attitudes and values that can be more or less functional for academic success. Nonetheless, as it will be discussed shortly, negative peer effects can be offset by active supervision by an adult.

Wilson (1987) argues that role models are one of the most important sources of information in the neighborhood affecting youth behavior. Successful adults in the community transmit values associated with productivity and accomplishment, which allows children to visualize their own future success. Since school achievement is closely related to success in the future, unemployment and unstable participation in the labor market among adults—both common in segregated areas- inhibit the formation of functional role models. In this case, education loses its importance as the motor for social mobility through a stable participation in the labor market.

In addition to social learning by association—or the influences of information in the neighborhood—there are particular socialization mechanisms that purposefully emerge from the normative structure of the community. This element of the community refers to a group of rules and values in the neighborhood that are more or less likely to provide attitudes and behaviors toward schooling that lead to academic achievement. For instance, the social control and bonding theories (Hirschi, 1969) suggest that individuals will conform to rules—i.e. children will go to school, do their homework, and comply with their teacher's requirements—only if they have clear norms and constant supervision that help them to stay away from deviant behavior. Children who grow up in communities where norms about schooling are clear and actively enforced by the adult population will be more likely to comply with school requirements and will do better in

school. In this sense, social control refers to the degree to which the community binds its members' behavior around common goals. Similarly, social bonding refers to the strength of ties in the community that makes social control more effective.

According to the sociological literature about the effects of concentrated poverty on educational outcomes, there are two interrelated socialization mechanisms emerging from the normative structure of the community: collective efficacy and intergenerational closure. These mechanisms respectively reflect the quality of social control and social bonding in the community. Collective efficacy refers to the neighbors' active involvement in children's supervision, in order to reach common goals based on shared values (Sampson, 1997, 2001; Galster, 2006). Furthermore, as mentioned above, collective efficacy or active adult supervision can offset the negative peer effects. Intergenerational closure (Coleman, 1989; Sampson et al 1999) refers to the strength of ties between parents, and between parents and children. Parents that know other parents and share information about each other's children have access to an additional reference point to evaluate their own child, in aspects other than schooling. This bond reinforces the clarity of norms in the community and makes collective efficacy even more effective.

2.4.2 Effects of Structural Elements in the Neighborhood

The spatial mismatch theory (Kain, 1968; 2004) suggests that the structure of opportunities available in the neighborhood affects individual outcomes and decision making. Lack of opportunities at the local level affects educational outcomes in two ways. In relation to non-educational opportunities, spatially mismatched labor opportunities explain the relatively high unemployment rates among adults, which is based on poor role models as described by Wilson (1987).

The second reason why spatially mismatched opportunities affect educational outcomes is related to the availability of educational opportunities. Children in poor and segregated neighborhoods have restricted access to a good quality education. When school choice is restricted to those schools within the place of residence, access to a good quality education is restricted, because local schools are locally funded; thus, as mentioned in the previous section of this chapter, in this case the social composition of the neighborhood is inextricably entwined with the social composition of the school. In a voucher system, where school choice is virtually unrestricted, access to good quality education in poor neighborhoods is restricted because schools have incentives to enroll non-poor children who are less expensive to educate.

Sociological theories have stressed the importance of institutional capacities for socializing children in deprived areas. Thus, if due to a spatial mismatch in education (Kain, 2004) children in neighborhoods of concentrated poverty are segregated in certain schools, these schools should have the institutional capacities required to provide students with the attitudes and behaviors that are functional for school success. However, the literature suggests that this is seldom the case.

As suggested by the theory of institutional socialization, one of the most important indicators of the institutional capacities required to provide children with functional attitudes and behaviors toward schooling is related to the role of teachers. In this sense, labeling theory (Becker, 1963) focuses on the informal or formal application of stigmatizing tags on individuals that have an actual impact on individual outcomes. A good example of how labels can explain low educational outcomes is provided by Rosenthal's (1992) "pygmalion effect" that asserts that teachers use labels to determine which children are more likely to be low or high achievers. Bauder (2002) suggests that children in areas of concentrated poverty are more likely to be labeled as 'dysfunctional'

for formal education because low educational achievement is rather common in those settings. What is notable is that labeling is an important way of providing certain attitudes and behaviors toward schooling that, in these circumstances, are dysfunctional for a successful academic path.

It is important to mention that labeling is not only a responsibility of teachers. In fact, the society as a whole stigmatizes neighborhoods of concentrated poverty, generating no-go/ no-exit areas where all inhabitants are considered untrustworthy (Lupton and Power, 2002). In this sense, socioeconomic segregation is related to the feeling of being a burden, dispensable, and invisible to the rest of the society (Sabatini, 2004). These feelings are very likely to translate into low educational outcomes among children in these areas of concentrated poverty.

Another element of the institutional capacity that affects educational outcomes refers to the relationship between the school and the community. The study of the neighborhood effects assumes an functional school-community bond is one where there is a correspondence between the characteristics of the cultural context in the community and the cultural context in the school (Lopez, 2004). In this fashion, Bourdieu (1977) argues that poor children are less likely to succeed in school because formal schooling is dominated by the cultural characteristics of the middle and upper classes, which puts poor children at a disadvantage. Thus, the school- community bond is weak in areas where poverty concentrates, because of the distance between the cultural context in the neighborhood and the cultural context in school.

Effective schools are able to reduce the gap between these two cultural contexts experienced by children. Keeping parents involved in children's education has proved to be important for academic achievement and for the transmission of norms (Arum, 2000; Sheldon and Epstein, 2005). However, in strengthening the school- community bond,

institutions in segregated neighborhoods often have to provide a great deal of additional support. In order to educate, teachers have to meet other needs that are not available at home, such as inculcating habits of personal hygiene and encouraging the development of self- esteem (Ossandon, 2006), which, given the shortage of resources, is often difficult to accomplish.

In sum, this unified theory of the effects of concentrated poverty on educational outcomes underscores the importance of structural and social elements in the community that, through the attitudes and behaviors of social mediators, have an impact on children's learning process. Out of these elements—available information, normative structure of the community, the available opportunities, and the institutional capacities in these educational opportunities—several indicators are identified. Peer and role model effects are good indicators of the consequences of both the available information in the community and the spatially mismatched educational opportunities. Collective efficacy and intergenerational closure indicate the effects of the normative structure of the community. The effect of educational institutions that have lower capacities than what is needed is translated into two main indicators: institutional socialization or labeling of dysfunctional children and the strength of the bond between the school and the community.

Chapter 3: Methods

This research combines quantitative and qualitative techniques in order to measure the effects of socioeconomic residential segregation on educational outcomes. Quantitative methods give an idea about the importance of spatial processes in education; qualitative techniques are used to gain a deeper understanding of the phenomenon.

The first methodological issue in the analysis of the consequences of spatial concentration of poverty on educational outcomes refers to the multiple aspects of socioeconomic residential segregation and the different ways of measuring each of them. In fact, the spatial separation of social groups in urban space has different dimensions that highlight different aspects of the phenomena. This research evaluates the effects of only one of these aspects.

Once the particular aspect of segregation that needs to be accounted for has been selected and measured, it is possible to implement the appropriate quantitative and qualitative methods, in order to estimate the relationship between socioeconomic segregation and educational outcomes. It will be explained below that this relationship develops through two distinct spatial processes: spatial heterogeneity and spatial dependence. Although both processes are related to one another they are estimated using two different quantitative techniques, each of which will be explained in turn. In addition, this research includes semi-structured interviews with parents, teachers, and principals in neighborhoods with different levels of segregation. This qualitative analysis is aimed at improving our understanding of the social mechanisms triggering these two spatial processes: spatial heterogeneity and spatial dependence.

The first section of this chapter discusses the different aspects and forms of measuring socioeconomic residential segregation. The second section presents the main techniques used in the analysis of the consequences of spatial poverty on educational outcomes. Spatial dependence and spatial heterogeneity are measured using spatial and multilevel models respectively. This second section includes a description of the qualitative approach used in order to identify and understand the social mechanisms behind these spatial processes.

3.1 MEASURING RESIDENTIAL SEGREGATION

Residential Segregation is defined as "…the degree to which two or more groups live separately from one another, in different parts of the urban environment" (Massey & Denton, 1988 p. 282). Therefore, socioeconomic segregation refers to the separation between the residences of the lower class and the residences of the middle and upper classes, and the degree to which social groups are located separately from one another in different neighborhoods of the city.

Although the concept of residential segregation seems fairly straightforward, in fact, the separation of groups in urban space manifests itself in several forms, and each corresponds to a different aspect of the phenomenon of segregation. Massey and Denton (1988) have identified five of these dimensions: evenness, exposure, clustering, centralization, and concentration. Since the dimensions of segregation refer to different characteristics of socioeconomic segregation and each of them is measured differently, in this research I select only one dimension of segregation, the one that is most appropriate for measuring the degree to which poverty concentrates in space. The following sub-section presents the definition and measurement of the dimensions of segregation and a

justification of the reason why the dimension of clustering is selected for the measurement of segregation in the remainder of the empirical analysis.

3.1.1 Dimensions of Segregation

3.1.1.1 Evenness

The dimension of “evenness” refers to the "differential distribution of social groups among areal units in a city" (Massey and Denton, 1988 p. 283) or how “even” is the distribution of the different groups of the population across spatial units within the city. In terms of this dimension, residential segregation is at its minimum when social groups are evenly distributed across neighborhoods or when all spatial units of the city have an equal proportion of the population belonging to the different social groups.[14] In contrast, evenness is minimized—and residential segregation is maximized—when any pair of individuals from two different social groups does not inhabit the same spatial unit in the city.

The most widely used measure of the dimension of evenness is the dissimilarity index (Duncan and Duncan, 1955; Teauber and Teauber 1965). For instance, if the city’s population is divided between the poor (x) and non-poor (y)[15], the dissimilarity index is computed as follows:

$$D = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{x_i}{x} - \frac{y_i}{y}\right| \qquad (1)$$

[14] Obviously, this proportion corresponds to the average proportion of social groups in the entire city.

[15] Poor and non-poor populations comprise the total population (t) such as: a) $x + y = t$, b) $x_i + y_i = t_i$ c) $\sum x_i = x$, and d) $\sum y_i = y$

where i = 1…n are the spatial units or neighborhoods within the city; x_i and y_i represent the number of poor and non-poor populations in the i_{th} zone respectively, and x and y are the total number of poor and non-poor populations within the entire city.[16]

One of the advantages of the dissimilarity index is that it offers a straightforward interpretation. A result that ranges from 0 to 1 can be interpreted as the proportion of the poor population (x) that needs to be moved from one neighborhood to another in order to make the distribution of the population "even" across spatial units within the city. Therefore, a high dissimilarity index implies that the poor population is located in certain spatial units whereas the non-poor population is located in other spatial units, which means that the level of segregation in the city is high.

Measuring socioeconomic segregation using the dissimilarity index as expressed in equation (1) presents at least two problems. The first problem has to do with the fact that the dissimilarity index was originally conceived to compute the "evenness" in the distribution of two groups in the population. [17] Therefore, spatial segregation between socioeconomic groups depends upon the definition of two socioeconomic groups and thus on the definition of poverty. While the definition of racial groups in order to measure racial segregation is rather straightforward, socioeconomic groups are less clearly recognizable. Besides, it can also be argued that there are more than two relevant socioeconomic groups. In this case, the dissimilarity index is not able to compute the "evenness" in the spatial distribution of three or more groups. The dissimilarity index has been modified for the analysis of the spatial distribution of more than two groups

[16] The dissimilarity index was meant to measure unevenness in the spatial distribution of racial minorities. Thus, it is common to find minorities—in this case the poor population—as N for non-white and majority—non-poor—as W for the white population.

[17] Note that in the previous formula, the total population is composed exhaustively by the poor and the non-poor.

through the Multi-group Dissimilarity Index (Reardon & Firebaugh, 2002). This index however, does not have a straightforward interpretation, as does its original counterpart.

The second problem with using the dissimilarity index as a measure of socioeconomic residential segregation relates to the fact that it evaluates segregation as the departure from an "equal" rather than a "random" distribution of the population, which seems rather arbitrary (Cortese et al, 1976; Cohen et al, 1978). Another measure that gauges the dimension of evenness is the Entropy Index. This index is more appropriate if socioeconomic residential integration—as opposed to segregation—is likened to a random distribution of the population. The Entropy Index "…measures departure from evenness by assessing each unit's departure from the reference group 'entropy' of the whole city." (Massey & Denton, 1988 p. 285). This index, also known as the information index (H), analyzes the distribution of groups within spatial units in relation to the randomness of the distribution in the area. However, since its value depends on the level of entropy that is linked to the proportion of the minority population in the area, this index does not fulfill the requirement of compositional invariance.[18] In fact, the level of entropy changes as the proportion of the minority changes. Thus the

[18] There are a number of requirements that a measure of segregation has to fulfill (Teauber and Teauber, 1965). One of them is the *composition invariance* that states that if the number of persons of group 'm' in each unit increases by a constant factor 'p' and the number and distribution of persons of all other groups is unchanged, segregation is unchanged. Although not all scholars agree that composition invariance is a desirable property of segregation measures it is important if segregation needs to be compared between units or between two points in time.
Other requisites/requirements are: *Organizational equivalence* (if a spatial unit is divided into 'k' units, each unit with the same group proportions as the original unit, segregation remains unchanged. Likewise if 'k' units with identical group proportions are combined into a single unit, segregation is unchanged); *Size invariance* (if the number of persons of each group in each spatial unit 'k' is multiplied by a constant factor 'p', segregation is unchanged); *Transfer principle* (if an individual of group 'm' is moved from spatial unit 'i' to unit 'j' where the proportion of persons of group 'm' is greater in unit 'i' than in 'j', then segregation is reduced); *Exchange* (if an individual of group 'm' in unit 'i' is exchanged with an individual of group 'n' in unit 'j', where the proportion of persons of group 'm' is greater in unit 'i' than in unit 'j' and the proportion of persons of group 'n' is greater in unit 'j' than in unit 'i', segregation is reduced); *Additive organizational decomposability* (if J spatial units are clustered in K clusters, then a segregation measure should be decomposable in K clusters, into a sum of independent within—and between—components); and *Additive Group Decomposability* (if M groups are clustered in N supergroups, then a segregation measure should be decomposable into a sum of independent within—and between—super-group components).

entropy index changes throughout time and from place to place even if the spatial distribution of the population remains unchanged, which makes it difficult to compare the index between different cities and/or time periods.

Another commonly used indicator of the dimension of evenness is worth mentioning. The Gini Index refers to the "mean absolute difference between minority proportions weighted across all pairs of areal units, expressed as a proportion of the maximum weighted mean difference, which occurs when minority and majority members share no area in common" (Massey and Denton, 1988 p. 285). However, this index does not provide additional information, since the dissimilarity index is in fact related to the Gini Index. Graphically, the latter is the maximum vertical distance between a Lawrence curve and the diagonal (Teauber and Teauber, op cit), while the Gini index is well known as the difference between the two curves.

3.1.1.2 Exposure

The dimension of exposure refers to the degree of potential contact allowed by the fact of sharing a physical residential area. In contrast to the dimension of evenness, the dimension of exposure does not depart from an ideal "even" distribution; instead "it attempts to measure the experience of segregation as experienced by the average majority or minority member" (Massey and Denton, 1988 p.287).

Socioeconomic residential segregation—in terms of isolation or lack of exposure—is captured by the isolation index *(xPx)*:

$$xPx = \sum_{i=1}^{n}\left[\frac{x_i}{x} \times \frac{x_i}{(x_i + y_i)}\right] \qquad (2)$$

where x_i and y_i represent the poor—minority—and non-poor—majority—population in each spatial unit 'i' and x represents the number of poor individuals in the city.

The isolation index "measures the extent to which minority members are exposed only to one another rather than to majority members" (Massey and Denton, 1988 p. 288). It ranges from 0 to 1 and can be interpreted as the probability that a poor individual shares the spatial unit where he/she lives with other poor individuals. The converse of the isolation index is the interaction index *(xPy)* that measures the degree to which the poor population in spatial unit 'i' is exposed to non-poor individuals inside the boundaries of the neighborhood (Lieberson 1981). Similar to the isolation index, the exposure index ranges from 0 to 1 and can be interpreted as the probability that a poor individual shares the spatial unit where he/she lives with other non-poor individuals.

$$xPy = \sum_{i=1}^{n}\left[\frac{x_i}{x} \times \frac{y_i}{(x_i + y_i)}\right] \qquad (3)$$

The dimension of exposure assumes that spatial proximity facilitates interaction between groups. Therefore, this measure is more explicit with respect to the link between the concept of residential segregation and interaction between groups, inasmuch as it assumes segregation increases as the level of interaction—or exposure—decreases.

When comparing residential segregation—in its dimension of exposure—between two cities or two periods in time, one must keep in mind that the level of exposure depends upon the size of the minority group (Blau, 1977 p.23).[19] Thus, in addition to the Entropy Index, if the poverty rate increases, residential segregation measured as exposure

[19] Exposure and Isolation indexes are sensitive to population composition. As the minority gets smaller the majority increases in number, which increases the minority's probability of being exposed to the majority. Thus, per construction, segregation is smaller in places where the minority is relatively more represented than in places where minority groups are relatively small.

will necessarily decrease, which may be misleading. The eta-squared or correlation ratio is often used to correct for this compositional bias.[20]

3.1.1.3 Clustering

The dimension of clustering refers to the extent to which areal units inhabited by the relatively disadvantaged group—let's say the poor—adjoin one another in space, forming a cluster of poverty.[21] Massey and Denton (op cit) identify several measures of clustering such as the Absolute Clustering Index (ACL), the Spatial Proximity Index (SP), and the Relative Clustering Index (RCL).[22]

Clustering can be easily measured through the spatial Moran's I, a measure of spatial autocorrelation, or the degree to which "things" in one place resemble "things" in adjacent locations. By means of the formula in equation (4), the spatial Moran shows the degree to which the poverty rate in one neighborhood is similar to the poverty rate in adjacent neighborhoods.

$$I = \frac{n\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{S_o \sum_i (x_i - \bar{x})^2} \qquad (4)$$

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[20] Eta squared is calculated as follows: $V = \frac{xPx - P}{1 - P}$, where xPx corresponds to the isolation index and $P = \frac{x}{x + y}$.

[21] Strictly speaking, clustering can also measure the level of concentration of wealth. That is, it can measure the degree to which spatial units inhabited by upper classes adjoin one another, forming clusters of wealth.

[22] For formulas and interpretation, see Massey and Denton, 1988.

where n is the number of areal units in the encompassing area, x_i is the poverty rate in neighborhood "i", and x_j is the poverty rate in neighborhood "j". [23] When measuring the spatial clustering of the poor, the spatial Moran corresponds to the weighted average of the deviations from the average poverty rate in a particular neighborhood and the deviations from the average poverty in the neighborhoods nearby. The weights (w_{ij}) define what can and cannot be considered as "nearby" and are expressed in W, the weight matrix, in which $w_{ij}=1$ if "i" and "j" are contiguous, and 0 otherwise.[24] Since certain spatial units have a larger number of contiguous spatial units than others, weights are standardized by $S_o = \sum_i \sum_j w_{ij}$, the number of shared boundaries in the encompassing area.

When there is no evidence of spatial autocorrelation, the expected Spatial Moran's I (E_I) tends toward zero since its expected value is estimated as $E_I = -1/(n-1)$ that converges to zero as the number of geographical sub-units (n) increases.

In the case of this research, the Moran's I refers to the relationship between two elements: the poverty rate in a particular neighborhood or spatial unit and the average poverty rate in the spatial units in the vicinity—those considered by the spatial weight matrix W. The latter is known as the spatial lag of the former.[25] The correlation can be visualized in the Moran's scatter-plot, which gives an idea of the relationship between the

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[23] Note the change in notation. While in the previous formula x referred to the size of the minority, in what follows, x refers to the percentage of poor individuals or the poverty rate.

[24] This is known as the contiguity matrix. In this case, neighborhoods in the surroundings are exclusively those that share a boundary. There are other ways of defining the weight matrix that consider, for instance, distance as a parameter in the definition of the surroundings. In this case, the matrix is known as the distance matrix and the value of w_{ij} is the inverse of the distance between the center of neighborhood "i" and the center of neighborhood "j".

[25] This way, analyzing spatial autocorrelation is similar to time analysis where the dependent variable in time t has its correlate in the past (time t-1). The difference is that the spatial autocorrelation vicinity goes in multiple directions—north, south, east, west, and the coordinates in between—whereas vicinity in time analysis is usually restricted to periods in the past. This is why spatial lag needs to be simplified, calculating the average in the vicinity.

poverty rate in neighborhood "i" and the poverty rate in the vicinity—its spatial lag. Spatial Moran's I is the slope of the simple regression between the standardized values of these two elements.

Since each observation in Moran's scatter-plot corresponds to a particular neighborhood, dividing the plot in four quadrants gives us an idea of which observations correspond to segregated neighborhoods. This corresponds to the local value of spatial autocorrelation, which is an efficient way to measure clustering at the local level and to visualize areas where poverty concentrates.[26] Anselin (1995) defines the local indicators of spatial association (LISAs) as "…any statistic that satisfies the following two requirements: a) the LISA for each observation gives an indication of the extent of significant spatial clustering of similar values around that observation; b) the sum of LISAs for all observations is proportional to a global indicator of spatial association" (Anselin, 1995 p. 94). The most commonly used LISA is the Local Moran's I that identifies the areas where clustering is statistically significant. These areas are called hot spots—areas with a high proportion of minorities surrounded by areas with similarly high proportions of the same group. Local Moran's I also identifies cold spots—areas with a high proportion of the majority surrounded by similar areas. Mathematically, local Moran's I is defined as

$$I_i = (x_i - \bar{x}) \sum_j w_{ij} \left(x_j - \bar{x} \right) \tag{5}$$

This LISA indicates how similar one neighborhood is to the neighborhoods in its surroundings. For normally distributed variables local Moran's I is asymptotically normal; thus, the index can be statistically tested to identify areas where clustering is

[26] Following this logic, segregated neighborhoods of poverty would be those where high poverty is surrounded by high poverty thus they would be located in the upper-right corner of the upper-right quadrant of the Moran's I scatter plot.

statistically significant.[27] This way, high poverty areas significantly surrounded by similarly deprived areas are called hot spots, whereas areas of low poverty significantly surrounded by other neighborhoods of low poverty are called cold spots.

3.1.1.4 Other dimensions

The last two aspects of segregation identified by Massey and Denton (op cit) are the dimensions of concentration and centralization. The former refers to the relative amount of physical space occupied by groups in the urban space, whereas the latter measures the degree to which a particular group is spatially located near the center of an urban area. Empirically, these are the most visible faces of segregation in many U.S. metropolitan areas. Since they are less important for the analysis of the problem of segregation in Latin American cities (Sabatini, 2004), these dimensions are not considered in this research.

3.1.2 Types of Measures

The dissimilarity index and the isolation index are simple and straightforward measures that account for the dimensions of evenness and exposure, both relevant in the case of Latin American cities. However, these measures have an important shortcoming: they do not identify which particular neighborhoods are segregated and which are not. In fact, in order to analyze the consequences of socioeconomic residential segregation, one needs a local measure that allows comparing the experiences of people residing in that particular place to the experiences of similar people located anywhere else. Local Moran's I solves this problem. As noted above, the decomposition of the global measure

[27] The moments of the local Moran's I can be derived using the principles outlined by Cliff and Ord (1981 p42-46). See Anselin, 1995 p. 99.

of spatial autocorrelation indicates which neighborhoods belong to a cluster of poverty, which neighborhoods are segregated in terms of clustering, and which neighborhoods are not segregated.

The measure of segregation available through the Local Moran's I differs from the dissimilarity and the isolation indexes in that the former provides a local measure of segregation, whereas the latter provides a global measure of segregation. These indexes also differ in that the former takes into account the spatial dimension of segregation. In fact, the definition of segregation in terms of clustering only makes sense when one neighborhood is related to other neighborhoods in the vicinity. This is a spatial relationship: neighborhoods are related because they are contiguous—they share boundaries—or because their centers are located at a certain distance from one another.

The spatial aspect of segregation is what makes the difference in the analysis of residential segregation. A local measure of evenness or exposure would be proportional to the poverty rate in the neighborhood regardless of the poverty rate in the surrounding areas, which is not different from the analysis of the effects of neighborhood poverty on individual outcomes. The spatial dimension of segregation implies the idea of "embedded poverty" rather than poverty alone. Thus, in the dimension of clustering, the analysis of residential segregation means analyzing the effects of concentrated poverty in an area that is larger than the neighborhood itself, but spreads to other neighborhoods in the area.

3.1.3 Measurement errors: defining areal units and the problem of scale

One of the most important problems in the measurement of segregation is the definition of areal units—neighborhoods—within the urban space. Conceptually, a neighborhood is difficult to define, since its boundaries are constantly being re-defined by their inhabitants. Methodologically, the problem of the selection of boundaries

suggests that segregation is, in a sense, a problem that varies with the scale in which it is measured.

Segregation can be measured using areal units of different sizes such as census blocks, census tracts, or county subdivisions. The grid problem, also called the modifiable areal unit problem (White, 1983; Massey and Denton, 1998, Sabatini, 2004), refers to the fact that the same distribution of the population leads to different levels of segregation, depending on the size of the selected spatial unit. Since large areal units are more likely to be more heterogeneous than small areas, the division of the city into a few large areal units brings about a smaller dissimilarity index than when small areal units are considered.[28] Thus, the selection of areal units is critical when the aim is to compare residential segregation between two cities or between two points in time. On the other hand, segregation might have different implications on different scales. Large clusters of poverty are arguably more consequential than small clusters of poverty, since the former are more isolating than the latter.

In sum, the definition of the boundaries of the neighborhood is relevant to the analysis of the consequences of segregation, because it affects the level of segregation itself and because segregation measured on different scales has different consequences. Thus it is likely that they are each a different phenomenon. Moreover, the definition of the boundaries of the neighborhood depends upon the nature of the problem being analyzed. For instance, the locality affecting economic activity may well be much more extended than the neighborhood affecting kinship. Some activities such as work can be carried out miles away, whereas others such as mutual support are more likely to occur more closely (Lupton, 2003). Thus, the contextual effects have to be measured on different scales depending on the outcome under study (Gephart, 1997).

[28] At its limit the dissimilarity index is zero when the areal unit is the entire city, whereas it reaches its maximum when the areal unit is the household.

Since this research is concerned with educational outcomes, the selection of the neighborhood needs to take into account the aspects of the environment that affect educational performance and the scale on which these aspects operate. The literature considers tangible and symbolic aspects of the community affecting educational outcomes (see Chapter 2). In terms of the former, the scale for the analysis of local schooling opportunities depends on certain features of the educational system, such as the ability to choose schools outside a defined catchment area. In relation to how the symbolic aspects of the community affect educational outcomes, it is reasonable to think they operate at a rather small scale. However, research in the U.S. has shown stronger effects using larger environments such as school districts or zip codes rather than census tracts (Brooks-Gunn et al, 1993).

In this sense, physical spaces are measured in order to capture social spaces. Neighborhoods cannot be regarded as containers in which social interactions take place; neighborhoods are sets of social networks whose boundaries depend upon the nature of the dimension being affected by it (Massey, 1994). This suggests that the boundaries of the neighborhood are internally defined by the scope of social interactions that take place in space. Glennester et al. (1999) define neighborhoods as entities that are made up of layers of interactions, defined by travel areas, physical characteristics and boundaries drawn by service providers. Thus, neighborhoods are socially and physically defined. The size and shape of areal units will vary from place to place according to the characteristics of the natural and constructed environment and the forms of local, political, economic, and social interaction. Kearns and Parkinson (2001) argue that a neighborhood exists at three levels: the home area that fosters the psychological goals of attachment, belonging, and values; the locality that denotes social status, and the urban district that provides a wider landscape of social and economic opportunities.

In practice, the selection of the areal units is often arbitrary, since it depends upon the availability of data. Nonetheless, researchers should consider that areal units of different sizes may lead to different conclusions. The most appropriate size will depend on the outcome under analysis and other considerations, such as the nature of the educational system.

3.2 CONSEQUENCES OF RESIDENTIAL SEGREGATION

The analysis of the consequences of socioeconomic residential segregation on educational outcomes is based on two concepts. On the one hand, space affects educational outcomes because it provides the vehicle through which behavior spreads from one group to another. On the other hand, space is characterized by certain conditions that affect processes within the unit. These two spatial processes are called spatial dependence and spatial heterogeneity. While spatial dependence denotes a process of contagion between units in space, spatial heterogeneity refers to the variation of relationships over space (Le Sage, 1999).

Methodologically, spatial dependence and spatial heterogeneity are analyzed using spatial and multilevel models respectively. This section discusses the main concepts of both of these tools.

3.2.1 Dependence, autocorrelation and spillovers in space

Spatial dependence refers to the tendency for observations close in space to be more highly correlated than those further apart. According to the first law of geography "everything is related to everything else but near things are more related than distant things" (Tobler, 1970 p. 234), meaning that things in one place depend upon things in

places nearby. The underlying assumption is that spatial propinquity—and the interaction between spatial units—generates a spatial process by which things that are close to each other affect one another.

The main reason explaining spatial dependence refers to the idea that spatial proximity affects behavior, due to exposure and diffusion. Behavior and antecedent conditions in spatial unit "i" have consequences on behavior in adjacent spatial unit "j" because the latter is exposed to the former (Morenoff et al, 2001). Spatial dependence exists because exposure leads to a process of diffusion of behavior that spreads from one unit of analysis to its vicinity. Spatial dependence is also a result of measurement error. In fact, the boundaries for collecting information—delineation of space into the spatial units we call neighborhoods—are arbitrary and may well miscalculate the ecological nature of the spatial unit in which the processes we are trying to measure occur.

Either way, the first law of geography states that spatial dependence is the rule rather than the exception (Anselin and Bera, 1998); as such, accounting for the correlation of observations closely located in space is as important as dealing with other common data-related problems, such as time auto-correlation in panel data and heteroskedasticity in cross section data. Technically, spatial dependence is a property of joint density functions and as such, it is virtually impossible to be verified in practice. Spatial autocorrelation—as a moment of the joint distribution—emerges as a more manageable approach—it can be estimated and tested—to tackle the problem of spatial dependence (Anselin and Bera, 1998). One way to test for autocorrelation is through the spatial Moran's I explained above.

Spatial spillovers can be defined as the benefits—or costs—that trickle down from a source to elements in the surroundings. In a sense, spillovers are a direct consequence of the phenomenon of spatial dependence, inasmuch as they can be

understood as spatial externalities enabled by a spatial autocorrelation process. Thus, it is likely that high levels of segregation—defined as the spatial separation of groups—hinder the degree to which different social groups interact and affect one another.[29] In other words, residential segregation inhibits positive externalities or spillovers from high-performing to low performing schools, or from integrated families to excluded families.

While spatial autocorrelation indicates the strength of spatial spillovers, it needs to be corrected, generally by means of spatial models. When a cross sectional data set shows spatial dependence, traditional econometric techniques are no longer useful for estimation and testing. Failure to account for spatial dependence in a cross section analysis has similar consequences to failure to correct for autocorrelation in a time-series analysis, by which things at one point in time are correlated to things in further periods.[30]

3.2.1.1 Spatial weights and spatial lags

Despite the similarities between spatial analysis and time series analysis, one of the main problems in spatial dependence models is that the notion of spatial shift is much less clear than the notion of time shift: while a time unit (t) has only one unit ahead (t+1) and one unit behind (t-1), in space, neighboring units can be multiple. Thus, spatial models use a spatial lag operator that refers to the weighted average of random variables in neighboring units.

Thus, the definition of a neighborhood set for each location is of critical importance. The spatial lag for the dependent variable "y" in the spatial unit "i" can be

[29] Thus, in segregated areas, spatial spillovers are produced between members of the same group, which reinforces and perpetuates the characteristics of the environment.

[30] Similar to the case of heteroskedasticity, in the presence of autocorrelation "the OLS estimators are still linear unbiased as well as consistent and asymptotically normally distributed, but they are no longer efficient"(Gujarati, 454). In practice, t and F tests are likely to give seriously misleading conclusions about the statistical significance of the coefficients.

expressed as $[W_y]_i = \sum_{j=1}^{N} w_{ij} y_j$. Value wij corresponds to the spatial weight applied to the dependent variable in unit "j", and depends on the spatial relationship between spatial unit "i" and spatial unit "j". In general, when w_{ij} takes value 1 it indicates adjacency between spatial units "i" and "j". In this case, the assumption is that dependence is restricted to adjacent units. Assuming that diffusion is a more continuous process that does not require adjacency, spatial weights can also be calculated as the inverse of the distance between spatial units "i" and "j" (Cliff and Ord, 1981). This way, closer units will have a bigger impact on unit "i" than further spatial units.

Thus, the first step that is necessary for modeling spatial dependence is to build an (N x N) matrix that captures the spatial relationship between all spatial units in the city. The matrix is known as the spatial weights matrix (W) and its construction implies making assumptions about the nature of the process of diffusion.[31] The elements in this matrix are used to calculate each spatial unit's spatial lag.

By convention, the elements in the diagonal—the spatial relationship between spatial units with themselves or w_{ii}—are set to 0. Also, the elements of the spatial weights matrix are typically row-standardized such as the sum of all w_{ij} is 1. As an example of the spatial lag resulting from an adjacency matrix, when a spatial unit has three neighborhoods—each representing one third of its "neighborhood"—with dependent variables of values 3, 5 and 1 respectively, the spatial lag of unit "i" will be $3 = \frac{1}{3} * 3 + \frac{1}{3} * 5 + \frac{1}{3} * 1$. In this sense, the spatial lag represents the weighted average of the value of y in neighboring units, also called a spatial smoother (Anselin, 1988).

[31] Some diffusion processes are more appropriately captured using an adjacency matrix, whereas other processes are better measured using a distance decay matrix. Unfortunately, in social sciences there is little theoretical guidance to inform this decision.

3.2.1.2 Spatial Models

As in time series analysis, there are two ways of incorporating spatial autocorrelation in a model: spatial processes can be categorized either as spatial autoregressive (SAR) or spatial moving average processes (SMA) in the error structure such as $E[\varepsilon_i \varepsilon_j] \neq 0$ for neighboring locations "i" and "j". Consider the following general spatial process (Lim, 2003):

$$y = \rho W y + X_1 \beta_1 + W X_2 \beta_2 + \varepsilon \quad (6a)$$

$$\varepsilon = \lambda W \varepsilon + \mu \quad (6b)$$

$$\mu \sim N\left(0, \sigma_\mu^2 I\right) \quad (6c)$$

where y is as (N x 1) vector of a dependent variable, W is an (N x N) spatial weights matrix, X_1 is a matrix that includes the constant term and K_1-1 explanatory variables, and X_2 is a matrix of K_2 spatially lagged explanatory variables. β_1 and β_2 are vectors of coefficients associated with the non-weighted and the spatially lagged coefficients respectively. ρ is the autoregressive coefficient associated with the spatially lagged dependent variable (Wy) whereas λ is the autoregressive coefficient for the error term. Finally, μ is a stochastic error term with E[μ]=0 and E[μμ']=σμ2I.

The general model has three spatial components on the right side of the equation, each of which corresponds to a particular form of spatial process. The first component ρWy assumes that the dependent variable in one point in space is dependent on itself in other parts of the city. The definition of what specifically is considered the "other" parts of the city is given by the spatial weights matrix W, whereas the strength of the association is given by coefficient ρ. The second part of the general model ($WX_2\beta_2$) assumes that the dependent variable in a particular spot depends upon certain

characteristics in the surrounding area given by the explanatory variables in matrix X_2. Again, the definition of the surrounding area is given by the spatial weights matrix W, whereas the strength of the association is given by coefficients in vector β_2. Finally, the third element in the equation $\varepsilon = \lambda W\varepsilon + \mu$, assumes that error terms are correlated across space. Similarly, the spatial structure of the association is given by matrix W, whereas the strength of the correlation is given by the coefficient λ. Taking these three elements separately, we can derive three spatial models: the spatial lag, the spatial cross-regressive, and the spatial error models.

The spatial lag model is appropriate when the focus of interest is "the assessment of the existence and strength of spatial interaction" (Anselin, 1999, p. 11). This type of spatial dependence is called substantive dependence inasmuch as it is the consequence of exposure, diffusion, exchange, and spillovers. In other words, this model assumes that a dependent variable in one spot is jointly determined by the dependent variable in the surroundings—the spatial lag. Formally, a spatial lag model is expressed in matrix form as:

$$Y = \rho Wy + XB + \varepsilon \tag{7}$$

which in its reduced form shows that—unlike in time series analysis—the spatial lag term is correlated with the disturbances, even if they are i.i.d.

$$y = (I - \rho W)^{-1} XB + (I - \rho W)^{-1} \varepsilon \tag{8}$$

Thus, the spatial lag term (Wy) has to be treated as an endogenous variable using maximum likelihood estimation or instrumental variables rather than OLS—which would be biased and inconsistent due to the simultaneity bias.

Spatial cross-regressive models are a spatial case of spatial lag models in which ρ is set to zero and spatial lags of explanatory variables are added to the regression model such as:

$$y = X_1\beta_1 + WX_2B_2 + \varepsilon \tag{9}$$

In this type of model, spatial dependence is assumed to be in the spatial lags of some explanatory variables. These types of models are restricted to certain mechanisms of spatial externalities. For instance, in a model in which educational outcomes are a function of poverty in the neighborhood, the spatial process would be restricted to the effects of poverty in contiguous neighborhoods. Spatial cross-regressive models allow for more specific conclusions and more policy relevant implications regarding different mechanisms that might cause spatial spillovers. The most common problem in this type of model is multicollinearity in the regressors, since it is likely that there is a spatial process in the explanatory variables themselves. Nonetheless, OLS coefficients will be unbiased (Lim, 2003).

Finally, spatial error models are referred to as "nuisance dependence" and are theoretically appropriate when one wants to correct the biasing effects of spatial autocorrelation due to the use of spatial data (Anselin, 1999). A spatial error model has spatial autoregressive disturbances and assumes that ρ and β_2 are set to zero and that $\varepsilon = \lambda W\varepsilon + \mu = \left(I - \lambda W\right)^{-1}\mu$ such as:[32]

[32] Assuming that (I-λW) is invertible and that |λ|<1 for stationarity (Anselin, 1988).

$$y = X_1 B_1 + (I - \lambda W)^{-1} \mu \tag{10}$$

A spatial error model shows a non-spherical variance-covariance matrix in the error term since $E[\varepsilon\varepsilon'] = \sigma_\mu^2[(I - \lambda W)'(I - \lambda W)]^{-1}$ (Lim, 2003). This matrix yields non-constant elements in the diagonal which means that the error term ε is heteroskedastic, regardless of the heteroskedasticity of μ (Anselin and Bera, 1998).

3.2.1.3 Model Selection

Model choice initially depends on the underlying theory. While neighborhood effects in economic studies are typically relegated to the error term, in sociology, any externalities could be constrained to pertain to the neighborhood characteristics themselves, such as education in one area being a function of poverty in adjoining areas (Anselin, 2003). In practice however, model selection is driven by the data. A number of statistical tests can be used to detect the presence of spatial autocorrelation in the residuals from a least-squares model. The first and most-used test for spatial dependence in the disturbances of a linear regression model is the Moran's I-statistic, the same one that was mentioned earlier for measuring residential segregation in its clustering dimension. The test was originally developed as a two-dimensional analog of the correlation coefficient in a univariate time series. Cliff and Ord (1981) formally presented Moran's I as:

$$I = \frac{N}{S_o}\left(\frac{e'We}{e''e}\right) \tag{11}$$

Where e is a vector of OLS residuals, W the spatial weights matrix, N is the number of observations and S_o is a standardization factor $S_o = \sum_i \sum_{j \neq i} w_{ij}$ equal to the sum of the spatial weights. When the weight matrix has already been standardized (i.e. row sum equals 1, thus total sums N) Moran's I simplifies as:[33]

$$I = \left(\frac{e'We}{e''e} \right) \tag{12}$$

As mentioned in the previous section in this chapter, for normal error terms the spatial Moran's I is asymptotically normal and can be tested as such. However, the test is unreliable since it picks up a range of misspecification errors, such as non-normality and heteroskedasticity, as well as spatial dependence.

The likelihood based Lagrange Multiplier (LM) test can be performed to test either error lags or spatial lags (i.e. Ho: ρ=0 and/or Ho: λ=0). The LM tests follow a $\chi 2$ distribution with one degree of freedom.[34] In practice, then, p values for robust and non-robust Lagrange Multiplier tests (SAR, SMA and SARMA) are compared and decided upon, based on theoretical reasons in case they are all significant.[35]

3.2.2 Spatial Heterogeneity

Spatial heterogeneity refers to the idea that—because of structural differences—the relationship between two variables is different in different places. Due to spatial heterogeneity, one neighborhood might show a strong relationship between educational

[33] Note the similarity between the spatial Moran's I and the Durbin Watson statistics. They differ only in the specification of the matrix that interconnects neighboring (subsequent) observations.
[34] This test does not have much power for small samples.
[35] For a formal specification of the test, see Anselin et al, 1996.

outcomes and certain input in the education production function, such as school size whereas another neighborhood may well show a weak or even a non-significant association between the two. In other words, the problem of the lack of structural stability of the various phenomena over space means that functional forms and parameters vary from place to place (Anselin, 1988 p.10). Due to heterogeneity, the assumption of error independence is violated.[36] In addition, heterogeneity of spatial units leads to misspecification and measurement errors that may lead to heteroskedasticity. Standard econometric methods that estimate random coefficients and structural instability can be adapted to take into account the problems associated with spatial heterogeneity.

Multilevel models take into account the nested nature of spatial data or the fact that some observations—such as schools and students—belong to certain spatial units and not others. In doing so, these types of models are able to account for the problem of spatial heterogeneity and to estimate the random variation of coefficients from one place to another. This section introduces some basic concepts of multilevel models as the tool for measuring spatial heterogeneity.

3.2.2.1 Multilevel Models: General Framework

Multilevel models explicitly recognize the nested nature of the data. [37] In doing so, these models allow coefficients in education production to vary across nesting units. For instance, consider the following unconditional model—a model without covariates—also called the ANOVA model. This model estimates an outcome "y" measured at level 1—indicated in subscript "i"—that is nested in level 2—indicated in subscript "j". Such a

[36] Any pair of observations randomly drawn from a sample will be systematically more correlated if they belong to the same group or neighborhood.

[37] The multilevel models follow the notation used by Raudenbush and Byrk (2002). These authors named these particular types of models after the software they made popular: Hierarchical Linear Models. In this dissertation I use both names, multilevel and hierarchical linear models, interchangeably.

model represents how variation in the dependent variable "y" is allocated across levels of analysis.

$$y_{ij} = \beta_{0j} + \varepsilon_{ij}, \qquad \text{where} \qquad \varepsilon_{ij} \sim N(0, \sigma^2) \tag{13a}$$

According to the equation at level-1 the dependent variable or outcome "y" from observation "i" that belongs to—or is nested in—unit "j" equals the group's average (β_{0j}) plus a random error or white noise (ε_{ij}). This error term is assumed to be normally distributed with mean 0 and constant variance (σ^2). Note that the groups' averages (β_{0j}) are assumed to be different in each nesting unit; that is the reason why the coefficient includes a subscript "j". What is interesting about multilevel models is that they specify the functional form of these varying coefficients. See for instance equation 13b that models the variation of the group's average:

$$\beta_{0j} = \gamma_{00} + \mu_{0j} \qquad \text{where} \qquad \mu_{0j} \sim N(0, \tau_{00}) \tag{13b}$$

In this case, the equation at level-1 or equation 13a allows only one coefficient to vary across nesting units "j" (β_{0j}). Thus, there is only one equation to be specified in the second level of analysis. The equation at level-2 or equation 13b shows that the mean of the dependent variable "y" in nesting unit "j" (β_{0j}) is equal to the grand mean (γ_{00}) plus a random error (μ) that is also assumed to be normally distributed with mean 0 and constant variance.

Replacing equation (13b) into equation (13a) provides the reduced model depicted in equation (13c). In the reduced model, the dependent variable—measured for observations "i" that are nested in units "j"—varies around the grand mean (γ_{00})

depending upon two sources of error, also called random effects. The first source of error (ε_{ij}) corresponds to a random variation of observations within nesting units, while the second source of error (μ_{0j}) corresponds to a random variability between nesting units. When the model is not well-specified, ε_{ij} and μ_{0j} also include the effects of certain unobserved characteristics of both, observations themselves—or level-1 units—and nesting or level-2 units respectively.

$$y_{ij} = \gamma_{00} + \varepsilon_{ij} + \mu_{0j} \tag{13c}$$

Each source of error is assumed to have a zero mean and a constant variance σ^2 and τ_{00} respectively.[38] Thus, in a two-level model like this, the total variance of the model corresponds to the sum of these two variances, σ^2 and τ_{00}. The relative importance of the source of error that belongs to the nesting unit—or the variance at level-2—is an indication of the magnitude of the problem of heterogeneity.

In order to illustrate the idea of the problem of heterogeneity, level-2 variance can be assessed in two ways. Firstly, since τ_{00} follows a χ^2 distribution with (J-Sq-1) degrees of freedom,[39] we can test the hypothesis that $\tau_{00} = 0$.[40]. Rejecting the null hypothesis implies that nesting units significantly contribute to total variance. For instance, when nesting units are neighborhoods, a significant variance at level-2 suggests the existence of spatial heterogeneity. Secondly, the intra-class correlation or the cluster effect (Raudenbush and Byrk, 2002) provides an estimation of the magnitude—rather than the

[38] This is not necessarily the case. In fact, spatial dependence due to measurement errors is often associated to heteroskedastic errors. Thus, robust estimation is also needed.

[39] Where J corresponds to the number of groups or nesting units and S_q corresponds to the subscript in the τ coefficient.

[40] Note that this is not the same as testing when there are no significant differences between nesting units in terms of the dependent variable. According to this hypothesis, the dependent variable can differ between nesting units, but this difference has to be fully explained by observed covariates included in the model.

significance—of the problem of heterogeneity. This correlation corresponds to the proportion of total variance that corresponds to level-2 units.[41]

3.2.2.2 Three-level models

Multilevel models allow any number of nested levels of analysis, where coefficients at one level become the outcome at the next level. For instance, three-level models can be used to estimate educational outcomes of children who are enrolled—and thus nested—in schools that, in turn, are located—and thus nested—within neighborhoods. A model, as such, accounts for the nesting nature of the data and estimates educational outcomes accounting for school heterogeneity and spatial heterogeneity at the same time. Consider the following set of equations:

Level 1) $y_{ijk} = \pi_{0jk} + \varepsilon_{ijk}$ where $\varepsilon_{ijk} \sim N(0, \sigma^2)$ (14a)

Level 2) $\pi_{0jk} = \beta_{00k} + r_{0jk}$ where $r_{0jk} \sim N(0, \tau_{00})$ (14b)

Level 3) $\beta_{00k} = \gamma_{000} + \mu_{00k}$ where $\mu_{00k} \sim N(0, \tau_{000})$ (14c)

Equations 14a, 14b, and 14c correspond to a fully unconditional three-level model for educational outcomes of students (level-1) that are enrolled in schools (level-2) that are, in turn, located in neighborhoods (level-3). Equation (14d) displays a reduced model that is obtained from this set of equations.

Reduced Model) $y_{ijk} = \gamma_{000} + \varepsilon_{ijk} + r_{0jk} + \mu_{00k}$ (14d)

[41] The intra-class correlation applies to unconditional or random-intercept models only. Random intercept models have only one random level-1 coefficient, β_{0j}.

Equation 14d suggests that educational outcomes of student "i" in school "j" in neighborhood "k" randomly varies around a grand mean $\gamma_{000.}$ This random variation has three error components: ε_{ijk}, r_{0jk}, and μ_{00k} that correspond to within school, between school, and between neighborhood variation respectively. This equation corresponds to a fully unconditional model that is useful for detecting spatial and school heterogeneity at level-3 (the neighborhood) and level-2 (the school) respectively. The total variance of the model is composed by variation at levels 1, 2, and 3. Thus, $V = \sigma^2 + \tau_{00} + \tau_{000}$. Spatial heterogeneity exists if coefficient τ_{000}, the variance at level-3, is statistically significant and intra-class correlation at this same level $\left(\frac{\tau_{000}}{\sigma^2 + \tau_{00} + \tau_{000}} \right)$ is not trivial.[42] Once heterogeneity has been tested for, covariates at levels 1, 2, and 3 can be included according to theoretical considerations. For instance, consider equation 15a, that estimates educational outcomes as a function of covariates X_1 and X_2.

$$y_{ijk} = \pi_{0jk} + \pi_{1jk} X_{1ijk} + \pi_{2jk} X_{2ijk} + \varepsilon_{ijk}, \qquad \text{where} \qquad \varepsilon_{ijk} \sim N(0, \sigma^2) \qquad (15a)$$

Equation 15a suggests that educational outcomes (y) from student "i" who is enrolled in school "j" that in turn is located in neighborhood "k" is a function of certain student-level covariates—such as sex, age, household socioeconomic status, etc. This equation states that these outcomes randomly vary according to an error term ε_{ijk} that is assumed to be normally distributed with mean equals zero and constant variance. Since multilevel models recognize the nested nature of the data, these models allow coefficients to vary across nesting units. This way, the effect of student covariate X_1 on educational

[42] Still, important neighborhood effects can exist even in the case of a low intraclass correlation (Sampson, 2001). As will be explained below, due to the problem of selection bias, the coefficients household and neighborhood effects may be indistinguishable from one another, or even dependent on one another.

outcomes depicted in coefficient π_{1jk} is assumed to be different between schools—thus the subscript "j"—and also different between neighborhoods—thus the subscript "k". As explained above, the form of this variation is modeled in equations at further levels.[43]

Equations at level 2 provide the functional form of each of the coefficients from equation 15a, or level-1 coefficients. Equation 15b assumes that schools' educational outcomes randomly vary around the neighborhood's conditional mean (β_{00k})[44] depending on the value of certain characteristics of the school (Z_1), such as whether the school is religious or not (see equation 15b). The intercept at level 1 (π_{0jk}) has been randomized—i.e. the equation includes a random error term. This means that, even after including observed covariates, the assumption is that there is a remaining heterogeneity at level 2.[45] Equation 15c suggests that the effect of the individual's covariate X_1 on educational outcomes is fixed for all schools in neighborhood "k" at the level given by coefficient β_{10k}. However, the model allows this effect to randomly vary between schools. Finally, the effect of an individual's variable X_2 on educational outcomes is given by coefficient β_{20k}. This effect is fixed for all schools in neighborhood "k" and—since it does not include a random error term—it is not expected to vary between schools or level-2 units.

$$\pi_{0jk} = \beta_{00k} + \beta_{01k} Z_{1jk} + r_{0jk} \quad \text{where} \quad r_{0jk} \sim N(0, \tau_{00}) \qquad (15b)$$

$$\pi_{1jk} = \beta_{10k} + r_{1jk} \quad \text{where} \quad r_{1jk} \sim N(0, \tau_{11}) \qquad (15c)$$

$$\pi_{2jk} = \beta_{20k} \qquad (15d)$$

[43] Thus, there are as many equations at level two as coefficients at level one, whereas there are as many equations at level three as coefficients at level 2.

[44] Note that β_{00k} is the conditional mean since there is an explanatory variable. So the mean is conditional to the value of that variable.

[45] There are a number of unobserved characteristics *of the school* that significantly explain variation in a student's educational outcomes.

The next step in this example of a three level model is to provide a functional form for the level-2 coefficients in equations 15b, 15c, and 15d that are allowed to vary across neighborhoods. In other words, this step is aimed at estimating the neighborhood effects. To do so, the model needs to specify as many equations as coefficients in level 2.

$$\beta_{00k} = \gamma_{000} + \gamma_{001} W_{1k} + \mu_{00k} \quad \text{where} \quad \mu_{00k} \sim N(0, \tau_{000}) \tag{15e}$$

$$\beta_{01k} = \gamma_{010} + \gamma_{011} W_{1k} + \mu_{01k} \quad \text{where} \quad \mu_{00k} \sim N(0, \tau_{010}) \tag{15f}$$

$$\beta_{10k} = \gamma_{100} + \mu_{10k} \quad \text{where} \quad \mu_{00k} \sim N(0, \tau_{100}) \tag{15g}$$

$$\beta_{20k} = \gamma_{200} \tag{15h}$$

Equations 15e and 15f assume that school average educational outcomes (β_{00k}) and the effect of school characteristic Z_1 on it (β_{01k})—see equation 15b—depend upon certain characteristics of the neighborhood W_1. These equations also assume that both coefficients have a random component—μ_{00k} and μ_{01k} respectively. Equations 15g and 15h provide a functional form for the effect of individual covariates X_1 and X_2 on educational outcomes respectively. While the former is expected to randomly vary around γ_{100}, the former is expected to be fixed across all schools and all neighborhoods at the level given by coefficient γ_{200}.

The three-level model that estimates educational outcomes of students "i" in schools "j" in neighborhood "k" portrayed in equations 15a to 15h provides a reduced model with six fixed effects and six random effects. The fixed effects correspond to the intercept (γ_{000}), the direct effect of individual characteristic X_1 (γ_{100}), the direct effect of individual characteristic X_2 (γ_{200}), the direct effect of school characteristic Z_1 (γ_{010}), the interaction effect between school characteristic Z_1 and the neighborhood characteristic W_1, and the direct effect of neighborhood characteristic W_1 (γ_{001}).

Random effects correspond to within school variation explained by individual characteristics ($\varepsilon=\varepsilon_{ijk}$), between school variation explained by school characteristics ($r= r_{0jk}+ r_1X_{1ijk}$), and between neighborhood variation explained by neighborhood characteristics ($\mu= \mu_{00k}+ \mu_{01k}Z_{1jk}+ \mu_{10k}X_{1ijk}$).

To summarize, neighborhood effects can be either random or fixed. It might be the case that the characteristics of the neighborhood explaining educational outcomes are observable—fixed—or unobservable—random. In addition, neighborhood characteristics might affect educational outcomes either directly—such as γ_{011}—or indirectly through the effect of other covariates from previous lower levels such as γ_{001}.

3.2.3 Estimation Problems

The estimation of spatial processes such as dependence and heterogeneity faces a number of methodological challenges. In addition to the measurement errors discussed in the previous section, compositional and endogenous effects are common problems in the estimation of neighborhood effects.

Compositional effects or the problem of selection bias refers to the possibility that people living in segregated areas share a number of characteristics explaining both residential choice and individual outcomes. Take the example of the education of the head of the household. Education is likely to explain some individual outcomes such as unemployment. Moreover, since low education is related to low income, it is likely that poor families in social housing are also families where heads of households have fewer years of education. Given that, at least in the Chilean case, social housing is one of the main causes of the spatial concentration of poverty, education can be considered as driving both unemployment and the fact that the household is located in a segregated

neighborhood.[46] Thus, if the goal is to analyze the effects of concentration of poverty on, for instance, the likelihood of unemployment, the collinearity between education at the individual level and education at the level of neighborhood makes the estimation difficult.[47]

The argument is that, in a sense, neighborhoods choose their inhabitants (Sampson, 2001). Thus, distinguishing household effects from neighborhood effects might be difficult. In other words, when socioeconomic segregation is high, neighborhood poverty is very likely to be correlated to some household characteristics, such as education or poverty itself (Mayer, 1997, 2002).

The consequences of the problem of selection bias can be significant if the characteristics explaining both the outcome and the residential situation are unobserved. [48] In this case, the error term is correlated to the covariates, which biases the estimation of coefficients. Moreover, the effect of concentration of poverty would be overestimated since it would be capturing the concurrent effect of these unobserved characteristics driving outcomes and residential choice. If, on the contrary, the nature of the selection bias is known, the problem turns into multicollinearity. In the case of the analysis of the concentration of poverty on educational outcomes, it is likely that the selection bias is caused by household socioeconomic status which is explicitly introduced in the model. The main consequence of multicollinearity is that coefficients sometimes fail to be

[46] In any case, social housing represents a structural restriction about where to reside (Bickford and Massey, 1991). If residential choices for people in social housing become limited, this restriction necessarily leads to concentration of poverty.

[47] Let us set aside for the moment the simultaneous relationship between unemployment and residential choices. I will refer to this problem in the next paragraph.

[48] This is the case when selection bias is produced by sampling or participation biases. In this case, participation or selection might be based on some unobserved characteristic that affects the outcome and the covariate of interest. Since this research uses census data, we can be reasonably confident that selection bias is explained by observed characteristics in the model.

statistically significant, which hinders the possibility of disentangling household from neighborhood effects.

On the other hand, concentration of poverty might be the result of certain individual outcomes, as well as the other way around. This situation is known as simultaneity or endogenous effects. For instance, long periods of unemployment predict poverty whereas household poverty goes along with fewer residential choices, which in turn lead to concentration of poverty (Sampson, 2001). Although the endogenous relationship between socioeconomic segregation and children's educational outcomes is less straightforward, there are other individual outcomes that are more difficult to analyze due to this problem. For instance, unemployment rates in segregated and non-segregated areas are caused only in part by spatially mismatched opportunities. The other part of the difference is due to a selective migration phenomenon by which less employable people move into segregated areas.

The traditional approach has been to overcome the problem of simultaneity by means of random assignment to neighborhoods,[49] instrumental variables, or sibling models (Duncan and Raudenbush, 2001). However, other authors argue that although important, "the endogeneity argument blurs the relational insight of sociology" (Sampson op cit p.15). Actually, social life is both interdependent on other people's choices and emergent from these choices. People make decisions depending on other people's choices which have contextual effects that go beyond individual control.

The idea that the neighborhood effects we are trying to measure are actually formed in this endogenous relationship brings to mind the issue of the timing of events. In this case, the simultaneity problem does not refer to things that "occur at the same

[49] When people are randomly assigned to neighborhoods, residential choice is not related to a number of household characteristics; thus the correlation between family-specific characteristics and context is somewhat broken. The MTO (Moving to Opportunity) and the Gautreaux program in the U.S. are examples of this type of random assignment.

time". Simultaneity refers to a cycle by which individual and contextual characteristics are reinforced in time. In fact, I would argue that this is an interesting phenomenon in itself that has been somehow developed by the idea of the "cumulative exposure process" (DiPrete and Eirich, 2006). This idea assumes that outcomes are affected by the duration of exposure to neighborhoods of concentrated poverty. In this way, socialization mechanisms enabling neighborhood effects would be explained by a lengthy exposure of social mediators to segregated areas.

The idea of the "cumulative exposure process" requires longitudinal data to be appropriately measured. This research relies on cross-section data with which the estimation of the cumulative effects of segregation is not possible; however, this idea presents an interesting research agenda for the future.

3.2.4 Qualitative analysis

A quantitative analysis of the spatial processes—heterogeneity and dependence—affecting educational outcomes is somewhat obscure in the sense that most of the time the hypotheses on the mechanisms driving spatial heterogeneity and spatial spillovers in education cannot be disentangled from one another.

The qualitative analysis of particular cases provides a better understanding of these mechanisms. This research incorporates the analysis of six educational communities located in three poor neighborhoods with different levels of segregation.[50]

Thus, educational communities—mothers, teachers, and principals—analyzed in this research differ in that they belong to poor neighborhoods with different levels of segregation and in that they can be considered instrumental or atypical. Instrumental schools are schools with low educational outcomes, whereas atypical schools are those

[50] See Chapter 6 for a description of the strategy adopted for case selection.

with higher than expected test scores. These differences allow making comparisons between two main factors: institutional capacities and the neighborhood's segregation.

The technique for data collection corresponds to semi-structured interviews that cover the following topics.[51] In relation to the experience of inhabiting segregated areas, mothers, teachers, and principals are asked about: a) identification of the neighborhood's boundaries, b) the situation of the neighborhood, c) a comparison with other neighborhoods, e) the quantity and quality of available opportunities in the neighborhood, f) feelings of isolation, and g) stigma. In relation to the mechanisms driving spatial processes, mothers are specifically asked about a) role models, b) the use of public spaces, c) intergenerational closure, g) social capital, h) collective efficacy, and i) institutional socialization. Teachers and principals are specifically asked about institutional socialization.

It is worth mentioning that the interviews are not intended for looking at patterns of the effects of concentrated poverty on educational outcomes. The main objective of the qualitative analysis is to obtain a better understanding of the social processes triggering spatial heterogeneity and spatial dependence. Nonetheless, the information collected during the interviews has been crucial for the process of quantitative estimation. In fact, multilevel models are specified using the input provided by the interviews. It is also worth mentioning that the theoretical framework informing the research questions may well be reformulated based on the information collected in the interviews. I will go back to this topic in Chapter 7.

[51] See Appendix 1 for the questions and a sample transcript in Spanish.

3.3 SUMMARY OF METHODS

This research combines quantitative and qualitative techniques in order to answer the main research question guiding the study—i.e. to what degree socioeconomic segregation affects educational outcomes of children living in neighborhoods of concentrated poverty.

In relation to the quantitative methodologies, two main methodological issues need to be addressed: the measurement of segregation itself and the measurement of the consequences of segregation. In relation to the measurement of residential segregation, different aspects of segregation need to be accounted for. Out of these aspects—evenness, exposure, clustering, centralization, and concentration—the dimension of *clustering* is considered the most informative for the analysis of the effects of socioeconomic residential segregation. In this fashion, the indicator known as the local Moran's I provides information about the situation of the target neighborhood, while taking into account the spatial dimension of segregation.

The effects of socioeconomic spatial clustering on educational outcomes can be understood by means of two concepts: spatial heterogeneity and spatial dependence. Spatial heterogeneity is the process by which educational processes in one neighborhood are different than educational processes in other neighborhoods. Spatial dependence recognizes that the neighborhood is not a closed and isolated entity, but instead it is inextricably related to the rest of the city. It also recognizes that—according to the first law of geography—close things are more related than distant things. Thus, the spatial process of dependence implies that educational processes in one neighborhood are related to educational processes in other neighborhoods.

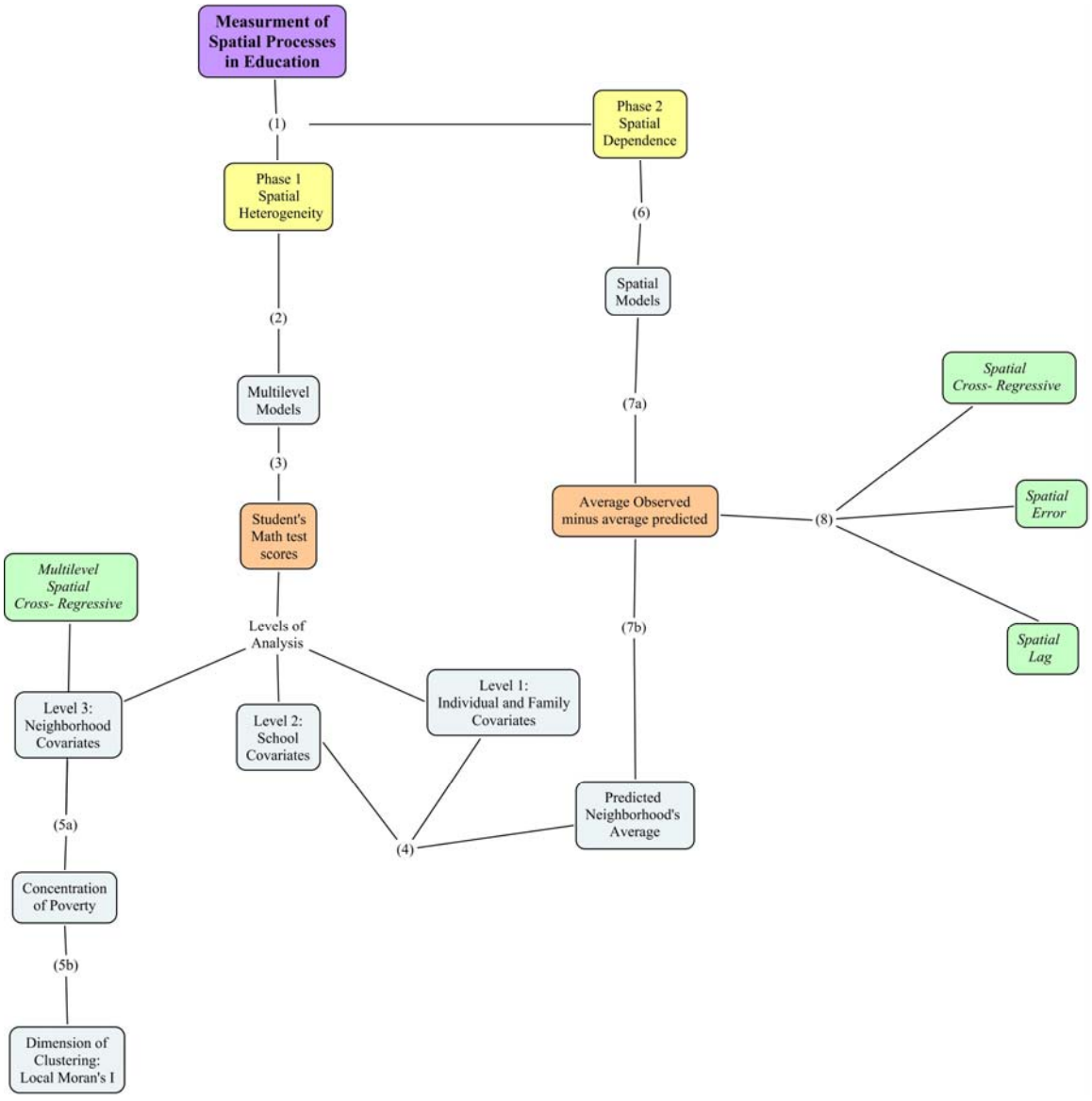
Since spatial heterogeneity and spatial dependence are simultaneous processes, this research adopts Morenoff's (2003) two step procedure, that combines multilevel and

spatial models in order to approximate a hierarchical spatial model that accounts for both processes —to some extent —simultaneously. Figure 3.1 is an attempt to summarize this two step procedure.

The first node in figure 3.1 indicates that spatial processes in education need to be measured considering two approaches: spatial dependence and spatial heterogeneity. In the first phase or step, the process of spatial heterogeneity is measured (see node 2 in figure 3.1) by means of a three level education production function that estimates math test scores of students nested in schools that, in turn, are nested in neighborhoods. Thus, as indicated by node 3 in figure 3.1, the dependent variable is the students' math test scores, whereas covariates—fixed and random—belong to individual/household, school, and neighborhood levels.

From this step I obtain two main products. The first product is the neighborhood's average predicted math score that will be used to compute the dependent variable in the spatial models in the second phase of the analysis. Node 4 in figure 3.1 indicates that this predicted neighborhood average is computed with a three-level model that includes covariates at the individual/ household and school levels only. At the neighborhood level, this model includes only the neighborhood random effect. This means that the predicted neighborhood average used to calculate the dependent variable in the spatial models is "clean" from the effects of the confounding effects of the lower levels of analysis—that can also suffer from spatial autocorrelation.

Figure 3.1 Two Step Procedure in Quantitative Analysis



The second product of the first step of the analysis corresponds to a complete model that includes covariates at all levels, including—as denoted by node 5a in figure 3.1—the direct and indirect effects of concentration of poverty. Node 5b indicates that the indicator of concentration of poverty has been previously computed by means of the local indicator of spatial autocorrelation; thus, it is a set of two dummy variables that take value 1 if the neighborhood can be considered a hot spot or a cold spot respectively, and zero otherwise. This product corresponds to a multilevel cross-regressive model, since one of the covariates at the neighborhood level corresponds to the spatial lag of the socioeconomic status.[52] This set of models is fully described in the first section of Chapter 5.

The second phase in the analysis corresponds to the calculation of spatial dependence in education. As mentioned above, in this two step procedure, a neighborhood's average predicted test scores has been previously computed using a three-level model with covariates at levels 1 and 2 only (see node 4). As shown in nodes 7a and 7b in figure 3.1, the dependent variable for the spatial models corresponds to the observed neighborhood's average minus the predicted neighborhood's average. This value contains only the random effects at each of the three levels and the portion that is susceptible to being explained by neighborhood characteristics. In this sense, this spatial model is "clean" of the effects of individual, household, and school characteristics.[53]

Spatial models are aimed at estimating spatial autocorrelation in a neighborhood's test scores. Spatial autocorrelation can take two forms: difusion or externalities. While the former describes an intrinsic process by which an outcome spreads to other places—such as in the case of a contagious disease—the latter refers to a more complex social

[52] Hierarchical spatial lag and hierarchical spatial error models cannot be estimated due to simultaneity problems. Hence, we need to use spatial models to give a full account of spatial dependence.
[53] Note that this dependent variable still contains the error terms that correspond to the individual/ household and school levels.

process that spills over to adjacent areas, generating similar outcomes. In methodological terms, a diffusion process would require a spatial lag model, where outcomes are dependent on their spatial lag. Spatial externalities are more likely to be measured by means of a spatial error model—where the social process that spills over is latent, unobservable, or even random—or a spatial cross-regressive—where we have an idea of what observed factors are spilling over and thus are causing these spatial externalities.

Multilevel and spatial models are somewhat imprecise in pinpointing the mechanisms triggering these spatial processes. Thus, this research also includes a qualitative analysis of students attending schools located in three neighborhoods in the city of Santiago. This qualitative analysis does not seek to explain patterns, but to interpret some of the socialization mechanisms in segregated areas. However, as explained above, the information collected in the interviews with parents, teachers, and principals has been decisive for the modeling of the multilevel models recently described.

Chapters 5 and 6 give a full description of the quantitative and qualitative analysis described in this chapter respectively. Before that, Chapter 4 presents a description of the spatial distribution of the population and the educational opportunities in the city of Santiago.

Chapter 4: Socioeconomic Segregation and Educational Opportunities in the City of Santiago

This chapter provides a description of the level of socioeconomic residential segregation and the distribution of schooling opportunities and children's educational outcomes in the city of Santiago. In order to do this, two main sources of information are used. On the one hand, the national Census of 2002 is used to calculate and visualize the spatial distribution of socioeconomic groups throughout the blocks, zones, and districts of the city. On the other hand, the National System for the Measurement of the Quality of Education (SIMCE), a standardized test applied nationally and periodically, provides information about educational outcomes and other characteristics of students and schools.

The first section of this chapter describes the sources of information and the way the variables under analysis are computed. The second section describes the main indicators of socioeconomic segregation, whereas the third section shows the distribution of educational outcomes across the city.

4.1 DATA

4.1.1 Census

Census data provides information that can be mapped at various levels of aggregation: census blocks, census zones, census districts, and municipalities.[54] Table 4.1 describes the structure of the city of Santiago. In 2002, the metropolitan area of Santiago considered in the analysis had a population of over five and a quarter million, distributed

[54] Due to identity protection/For purposes of confidentiality, household and individual information cannot be mapped in their exact location.

over approximately 15,400 squared kilometers of territory. In 2002, the city was physically divided into 41,389 census blocks, 1,327 census zones, 373 census districts and 34 municipalities.

Table 4.1 Metropolitan area of Santiago, 2002: Spatial Units

Spatial Unit	N	Average Population
Blocks	41,389	128
Zones	1,327	3,990
Districts	373	14,197
Municipalities	34	155,746
City		5,295,351

Source: Census, 2002

Since the Chilean census does not provide a measure of income or poverty, socioeconomic groups have to be constructed according to the methodology developed by the Chilean Association of Institutes of Market and Opinion Studies (AIM). This methodology—widely used in the analysis of the socioeconomic distribution of the population—assigns a score or socioeconomic index to each household. This score is proportional to a number of variables that are combined and weighted differently according to each variable's importance. The variables used to calculate the socioeconomic index—such as the possession of a number of basic goods, housing quality and education and labor status of the head of the household—indicate differences in lifestyles, consumption patterns, and purchasing power.[55]

[55] To select these variables the AIM conducted a survey during the second half of 2000 including 5,400 households in the city of Santiago. One of the main conclusions of this study is that many of the variables that significantly indicate differences in socioeconomic status are directly observable and can be assigned according to housing quality and the surroundings. Although the study concludes that not all variables have the same significance, it also concludes that, due to a high degree of multicollinearity, using only a few variables can give a robust and precise measure of socioeconomic status. These variables are the possession

The socioeconomic index is constructed based on four sub-indexes that, in turn, are based on a number of variables available from the census. These sub-indexes correspond to possession of goods, housing quality, occupation of the head of the household, and the education level of the head of the household. The household socioeconomic index corresponds to the non-weighted average of these four indexes and ranges from 0 to 1,000.

The AIM stratification method classifies socioeconomic status into five groups. From high to low, these are ABC1, C2, C3, D, and E defined by percentiles 10, 45, 70, and 90 respectively. Table 4.2 shows the results for the city of Santiago in 2002.

Table 4.2 Socioeconomic Stratification

	Population (%)	**Socioeconomic Index**	
		From	**To**
High (ABC1)	10%	814	1000
Medium-High (C2)	20%	602	814
Medium (C3)	25%	434	602
Medium-Low (D)	35%	257	434
Low (E)	10%	0	257

Source: Census, 2002

AIM pre-defined groups constitute the the analytical basis of the level of spatial socioeconomic segregation. Nonetheless, for reasons that are explained below, dissimilarity and isolation indexes are also computed for socioeconomic quintiles of the population.

of goods in the household, total income, labor status, and the education level of the head of the household and housing quality. Total income is the only variable not available in the census.

4.1.2 National system for the measurement of the quality of education

The National System for the Measurement of the Quality of Education (SIMCE) is a national standardized test on the topics of math, language, and natural and social sciences. The test is applied nationally and periodically to all children in the 4th and 8th grade of primary school and the 2nd year of secondary school.[56] Every time it is applied, the test includes questionnaires for parents in order to collect information about household characteristics. In turn, teachers answer an additional questionnaire that captures information about pedagogical practices, expectations, parental involvement, etc.

The analysis of educational outcomes is based on math test scores of 4th grade students in the metropolitan area of Santiago-Chile. Contextual effects are more clearly measured in the analysis of math scores due to the belief that while comprehension of mathematics relies more heavily on school quality, language learning is more dependent on household characteristics. Thus, it is expected that school effects are more important for math outcomes, while household effects are expected to be relatively more important for language test scores.

The second assumption that guides data selection refers to the age at which contextual effects are measurable. It is expected that small children are more tied to their mothers, families, and local communities, which makes them more sensitive to the socialization mechanisms that drive the spatial processes that this research wants to measure. Although it was suggested in the previous chapter that contextual effects are cumulative in time (Howell-Moroney, 2005), it is also recognized in this research that—when growing up and becoming more independent—children are likely to get exposed to

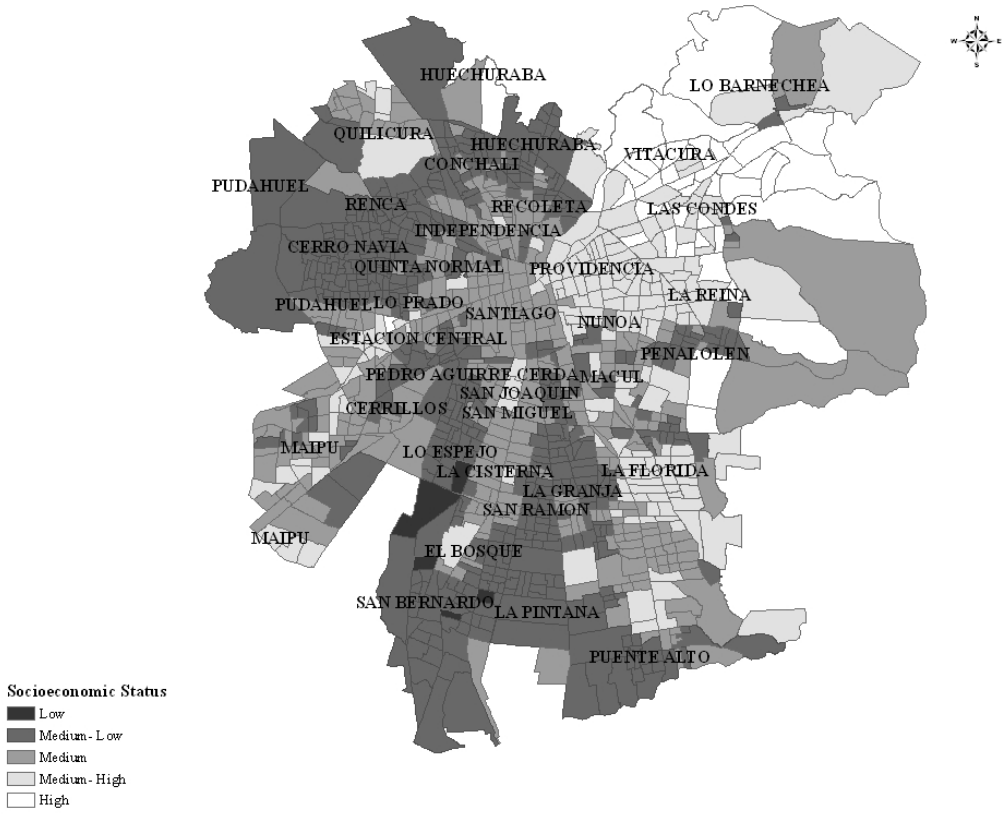
[56] Compulsory education in Chile includes eight years of primary education—from ages 6 to 13—and four years of secondary education—from ages 14 to 17.

other spatial contexts. In other words, older children are more likely to be exposed to multiple spatial contexts, which cause difficulties for the estimation of contextual effects. Similarly, as is demonstrated in Chapter 5, small children—in particular children from low income families—are less likely to travel large distances to go to school. Thus, since it is very likely that the school is located within the neighborhood, small children are more likely to be limited to one particular neighborhood.

4.2 RESIDENTIAL SEGREGATION IN THE CITY OF SANTIAGO

Latin American cities are characterized by a pattern of socioeconomic residential segregation by which socioeconomic groups settle separated from one another, forming large homogeneous clusters of population. Urban development in the 20th century has been for the most part characterized by the spatial concentration of the elite in an area that extends toward the peripheries and is connected to the city center on one side. Similarly, the poor population concentrates on the opposite periphery. The city of Santiago in Chile is not an exception. Map 4.1 shows how the upper classes—depicted in lighter colors—concentrate in a cone-shaped area that extends from the city center towards the northeastern part of the city, in the municipalities of Las Condes, Providencia, Vitacura and La Reina. In contrast, low-income neighborhoods—in darker colors—are located—for the most part-in the northwestern and southern peripheries.

Map 4.1 Socioeconomic status in the metropolitan area of Santiago



Source: Census, 2002

When socioeconomic groups tend to concentrate in opposite parts of the city, residential segregation is expected to be high. However, residential segregation has many dimensions and there are different ways of measuring it. Each of these dimensions and measures provides a different insight to the problem of socioeconomic residential segregation. As discussed in Chapter 3, the dimensions that make more sense in Latin American cities are the dimensions of evenness, exposure, and clustering that are

measured by means of the dissimilarity index, the exposure index, and the spatial Moran's I respectively.

Since the level of segregation depends upon the size of the spatial unit, the indicators of residential segregation—those of evenness and exposure—are measured using census zones, census districts, and municipalities. As stated in Chapter 3, large areal units are more likely to be more heterogeneous than small areas; thus, the use of large areal units leads to a smaller dissimilarity index than when small areal units are considered; thus, working with units of several sizes provides a range or interval within which segregation varies according to the size of the spatial unit. As explained below, the indicator of clustering—spatial Moran's I—gives a better estimation of segregation if it is computed using the smallest spatial unit available. As will be explained below, variations in the level of clustering measured by spatial Moran's I are mainly driven by the nature of the spatial weight matrix.

4.2.1 Evenness

The distribution of the poor population across the city's spatial units is fairly uneven. Table 4.3 shows the percentage of people from any given socioeconomic group that should move from one spatial unit to another in order to make the distribution of the population even. As expected, the level of residential segregation in terms of the evenness of the distribution of the population is higher when the dissimilarity index is calculated using smaller spatial units. In 2002, 38.7% of the poorest population—group E according to the AIM methodology or the bottom 10%—should move from one census zone to another in order for all census zones to have an equal share of this group—i.e. 10%. This percentage diminishes as the size of the spatial unit increases. Thus, 35.8% of

the poorest population should move between census districts, and only 26% of the same group should move between municipalities in order to create a non-segregated city. [57]

Table 4.3 Metropolitan area of Santiago: Dissimilarity Index, 2002

Minority	Census Zone	Census District	Municipality
Low-Income:			
Bottom 10% (group E)	38.7%	35.8%	26.0%
Bottom 45% (groups E and D)	36.1%	33.0%	25.3%
Elites:			
Upper 30% (groups C2 and ABC1)	44.7%	41.7%	34.4%
Upper 10% (group ABC1)	62.4%	60.5%	51.2%

Source: Census 2002

An interesting feature of the city of Santiago—and arguably of many Latin-American cities—is that residential segregation is higher for the elites than for low income groups. This is, when the minority group is formed by low income groups, the dissimilarity index ranges roughly between 25%—share of population from the bottom 45% of the income distribution that should move from one municipality to another—and 39%—share of population from the bottom 10% of the income distribution that should move from one census zone to another in order to make the distribution of the population even. However, when minorities are considered to be middle and upper income classes the dissimilarity index is systematically higher. In fact, in this case, the dissimilarity index varies roughly between 34%—share of population from the top 10% of the income

[57] In this case, a non-segregated city means that all spatial units have the same share of the poorest population (the bottom 10%) and the same share of the non-poor population (everyone else). Since dissimilarity computes the evenness of the distribution between two groups it says nothing about the rest of the socioeconomic groups, since they are all considered as one group: the non-poor.

distribution that should move from one municipality to another—and 62% —share of population from the top 10% of the income distribution that should move from one census zone to another in order to make the distribution of the population even. This means that in Santiago, the problem of segregation is mostly driven by the fact that the middle and upper classes concentrate in particular spatial units, mostly in the north eastern part of the city (see map 4.1 above). Although the phenomenon of the spatial concentration of the elites may well have measurable positive consequences for the individuals residing in those areas, the backside of the story is that spatial isolation of the middle and upper classes further isolates the lower classes.

4.2.2 Exposure/ Isolation

The dimension of exposure refers to the level of interaction between social groups, under the assumption that interaction is more likely to take place within spatial units. Thus, social groups that share space have higher chances of interaction than social groups that are located in different parts of the urban space. As explained in Chapter 3, isolation and exposure indexes are sensitive to population composition. That is, a relatively small minority is more likely to be less isolated and more exposed to the majority, only because of its size. Thus, since one cannot compare isolation indexes for groups of different sizes, the isolation index has been computed for two pairs of different comparable minorities: the bottom 10% (low income group E) and the upper 10% (high income group ABC1) of income distribution, and the bottom 20% (the poor population) and the upper 20% of income distribution.

Table 4.4 shows the results of this exercise. The poorest population (the bottom 10%) has a probability of sharing the census zone with other persons from the same group that ranges between 32% and 19%, depending upon the size of the spatial unit

considered for analysis. On the other hand, the upper classes are more isolated from the rest of society than are the poorest 10%. In fact, the probability that individuals from the top 10% of the income distribution would share space with other individuals from the same group varies between 49% and 69%, depending upon the size of the spatial unit.

Table 4.4 Metropolitan area of Santiago: Isolation Index, 2002

Minority	Census Zone	Census District	Municipality
Low-Income:			
Bottom 10% (group E)	32.1%	25.3%	19.0%
Elites:			
Upper 10% (group ABC1)	68.9%	62.6%	49.1%
Low-Income:			
Bottom 20% (poor pop.)	50.3%	42.0%	33.3%
Elites:			
Upper 20%	69.7%	62.7%	49.0%

Source: Census, 2002

As expected, increasing the size of the minority increases its degree of isolation. Hence, the probability of lack of interaction with other social groups for the population from the bottom 20% of the income distribution—which roughly coincides with the population under the poverty line—ranges between 33% and 50%, whereas the probability of social isolation for the top 20% ranges roughly between 50% and 70%.[58] Interestingly, the social isolation gap between the top 10% and the bottom 10% is smaller than the same gap between the top 20% and the bottom 20%. This indicates that the very

[58] Interestingly, the isolation of the top 20% from the rest of the society is not radically different from the level of isolation of the top 10%. Since the group has increased in size, it is expected that the isolation level also would have increased, which is not the case. Thus, one can assume that the tenth decile is rather similar to the ninth decile of income distribution.

poor find ways to integrate, probably because they do not have access to social housing and have the freedom to locate in informal settlements near the middle and upper classes. Residential decisions among the poor population (the bottom 20%), are restricted by the location of social housing, which is often in the peripheries. This policy is a clear contribution to the social isolation of the poor.

4.2.3 Clusters of Poverty

Spatial Moran's I tests for the existence of spatial autocorrelation between one dependent variable and the same variable in the areas nearby. Positive significant spatial autocorrelation of poverty means that the poverty rate in one area is positively correlated to the poverty rate in the vicinity. Spatial autocorrelation can be considered an indicator of clustering.

Moran's I can be calculated both to determine the general level of clustering within the city and to determine whether a particular spatial unit is part of a cluster of poverty—i.e. it is "segregated"—or it is not. As discussed in Chapter 3, the global spatial Moran's I measures the correlation between two elements: a) the socioeconomic characteristics of the spatial unit and b) the socioeconomic characteristics of other spatial units nearby. Local Moran's I emerges from the location of each point—spatial unit—in the quadrants determining the relation of this correlation. Term (b) is known as the spatial lag and its value depends on the spatial weight matrix that specifies what can be considered "the vicinity". Other than the neighborhood matrix, the size of the spatial unit is also critical for the measurement of spatial Moran's I.

Regarding the spatial weight matrix, and as it was discussed before, deciding on the form of the matrix is dependent upon the assumptions made regarding the nature of the interaction between spatial units. Since there is little research about this topic, the

strategy adopted in this research is a comparative one. This way, using a contiguity matrix of order, one allows assessing low scale spatial autocorrelation, whereas a spatial matrix of higher order is used to assess higher scale spatial autocorrelation.

As occurs in the case of the dissimilarity and the exposure indexes, Moran's I varies with the size of the spatial unit. As mentioned in Chapter 3, it is better to use the smallest possible unit. Since the software only allows a spatial matrix of limited dimensions, it is often not possible to work at the smallest possible level—i.e. the census block. In the case of the city of Santiago, that is formed by more than forty thousand blocks or spatial units (N), an (N x N) matrix is impossible to calculate.[59] Thus, the next level of aggregation—census zones—is better for calculating the level of clustering in the city.

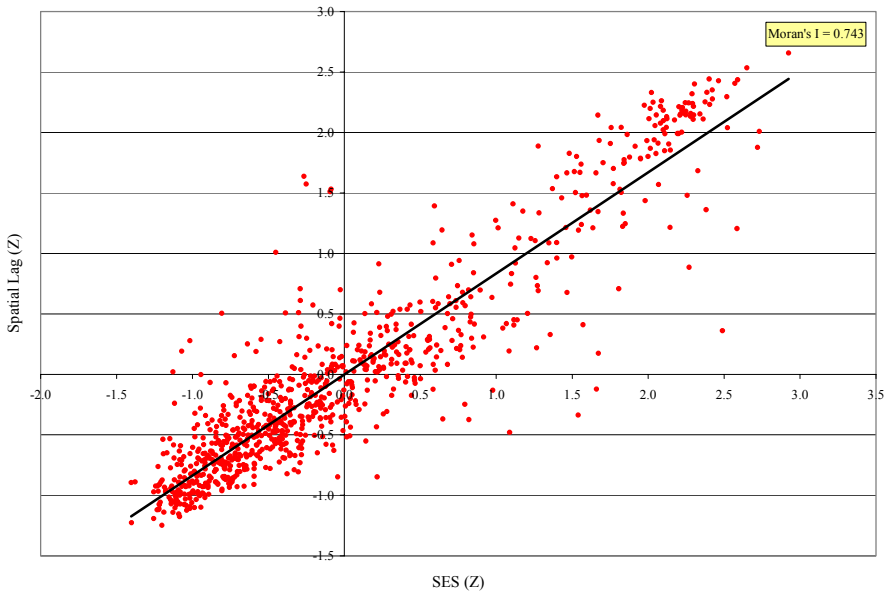
Figure 4.1 depicts the relationship between the standardized value of the socioeconomic score calculated from the Census and its standardized spatial lag, calculated with a contiguity matrix of order 1.[60] The slope of the simple regression between the two is the global spatial Moran's I, which turns out to be positive and significant.[61]

[59] Note that for the selection of the case studies neighborhoods were selected based on the level of clustering in the area. Clustering was calculated using local Moran's I or spatial autocorrelation between blocks. This was possible because each spatial Moran's was partially calculated by dividing the city in smaller pieces, which allows diminishing the dimensions of the spatial weight.

[60] Such a spatial weight matrix defines the "vicinity" of spatial unit "i" as the census zones that share a boundary—i.e. are contiguous—to it.

[61] Statistical testing is based on pseudo-alpha, calculated throughout a series of randomizations (see Anselin, 1995).

Figure 4.1 Socioeconomic Index in Census Zones Morans'I Scatter Plot



Source: Census, 2002

Based on Global Moran's I it can be argued that spatial autocorrelation of poverty across census zones is positive and significant. In other words, poverty in the neighborhood significantly predicts poverty in contiguous neighborhoods. Table 4.5 shows the results of global Moran's I for different spatial weight matrixes. The first column indicates the contiguity order of the matrix while the second and third columns provide the correlations between the socioeconomic index in each census zone and its spatial lag. In the second column the spatial weight matrix of order 'n' includes all orders between 1 and n, whereas in the third column the spatial weight matrix only includes neighbors of order 'n' and not the ones in between. For instance, the spatial lag calculated using the weight matrix of order 2 includes first and second order neighbors in the second column and only the neighbors of second order in the third column. In general terms, the

correlation between socioeconomic status at the neighborhood and the socioeconomic status in the vicinity loses strength as the area defining the "vicinity" gets larger. Nevertheless, spatial autocorrelation or clustering is positive and significant at small and large scales, with a limit of contiguity matrix of order 10 that provides a non-significant correlation.

Table 4.5 Socioeconomic Index in Census Zones: Global Moran's I, 2002

Vicinity Order	Spatial Weight Matrix (W)	
	Includes intermediate levels	Does not include intermediate levels
1	0.743***	
2	0.637***	0.596***
3	0.560***	0.493***
4	0.492***	0.398***
5	0.426***	0.310***
10	0.200 (ns)	

Source: Census, 2002

As discussed in Chapter 3, the particular situation of neighborhood 'i'—i.e. whether it is segregated or not—can be obtained from the local Moran's I that is, in turn, a result of the global Moran's I. In this case, areas of concentration of poverty correspond to the neighborhood's fulfilling two requirements: the neighborhood has a low socioeconomic index and its spatial lag also has a low socioeconomic index. Local Moran's I calculated from GEODA consider as hot spots all points that are significantly located below the zero marks. Thus, hot spots are neighborhoods of lower-than-average SES that are significantly surrounded by other lower-than-average neighborhoods. However, this does not necessarily represent a problem of concentration of poverty. Since the poverty rate in 2002 is around 20%,[62] hot spots are defined as the areas from the

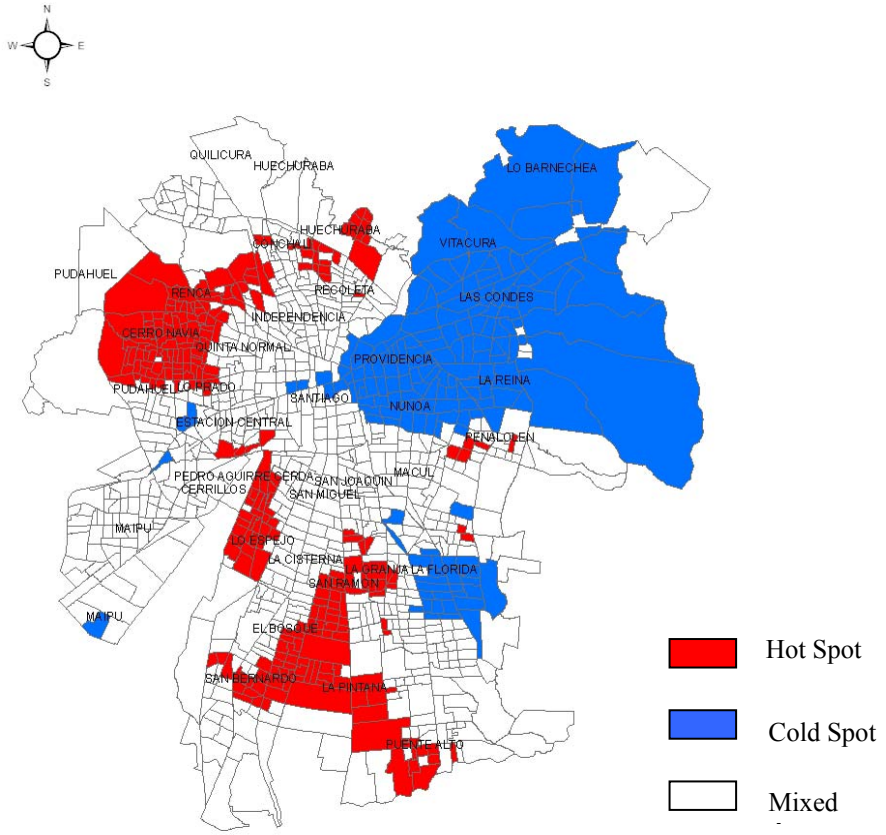
[62] According to the household survey CASEN, the poverty rate in 2003 was 18.8% (CASEN, 2003).

bottom 20% of the socioeconomic distribution that are significantly surrounded by other similar areas. Similarly, cold spots are defined as those areas from the top 20% of the income distribution. According to the Chilean household survey (CASEN) in the metropolitan area of Santiago, household incomes in the first quintile are below 0.4 units of standard deviations from the average. Similarly, household incomes in the fifth quintile are above 1.3 units of standard deviations from the average. This represents another restriction in the definition of hot and cold spots. Areas of concentration of poverty (hot spots) correspond to the neighborhoods from the first quintile that are significantly surrounded by other neighborhoods from the first quintile. Similarly, areas of concentration of wealth (cold spots) correspond to the neighborhoods from the fifth quintile that are significantly surrounded by other neighborhoods from the fifth quintile.[63]

Map 4.2 displays hot spots (red census zones) cold spots (blue census zones) and mixed areas. Consistent with the spatial socioeconomic distribution of the population, hot spots are located mainly in the southern and northwestern peripheries of the city in the municipalities of La Pintana, Cerro Navia and Renca. Other hot spots can be found in the northern fringe (Huechuraba), in the municipality of Lo Espejo and in some areas toward the east (Peñalolen). Cold spots are mainly located towards the north east in the municipalities of Las Condes, Providencia, Lo Barnechea, Nuñoa and Vitacura, and in some areas of the municipality of La Florida.

[63] Note that two important assumptions are made. First I assume that the socioeconomic index is a good predictor of household income. Secondly, all individuals in each census zone are considered equal to the local average.

Map 4.2 Census Zones: Hot spots, cold spots and mixed areas, 2002

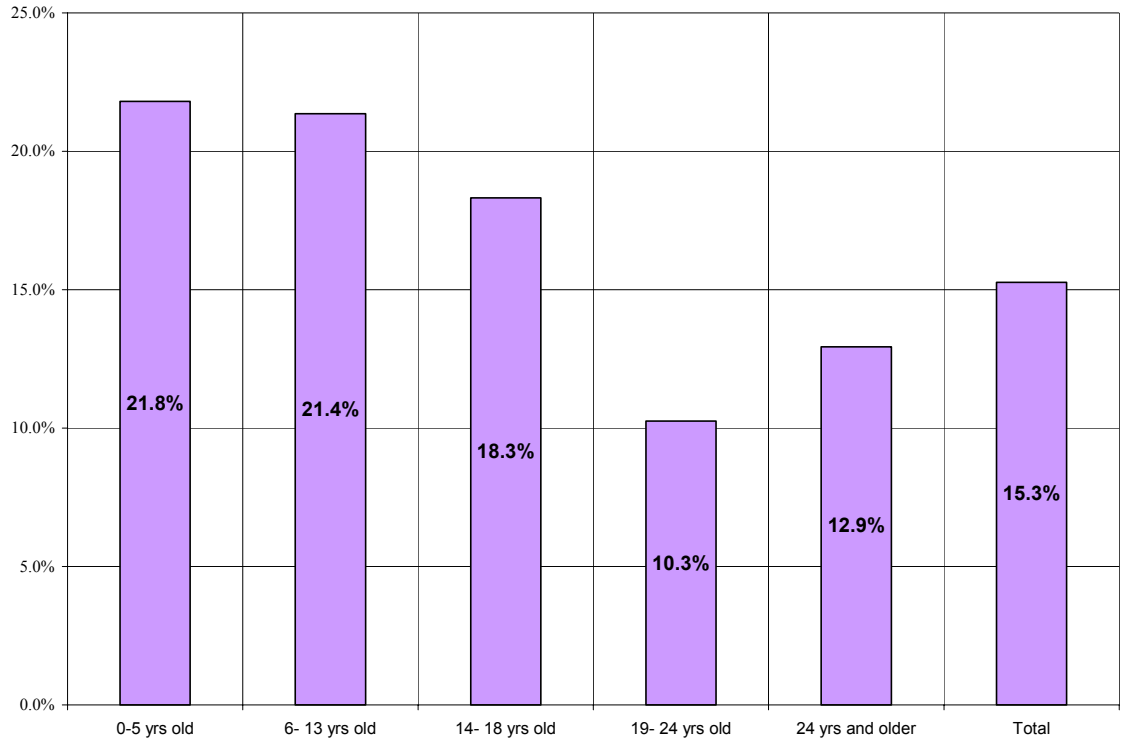


Source: Census, 2002

According to the Census (2002) around 1.3 million people reside in hot spots. This corresponds to almost one fourth of the population in the Metropolitan area of Santiago. 63% of the residents of hot spots are households from the first quintile. Thus, the spatial poverty rate, or the share of population that is poor *and* inhabits areas where poverty concentrates, reaches 15.3%—close to eight hundred thousand people.

According to census data 33% of pre-school and school-aged children—between 0 and 18 years old—belong to households from the first quintile. In addition, 20.7% of children between 0 and 18 years old are poor *and* reside in areas where poverty concentrates. In general, younger children are more likely to experience poverty at the household *and* at the neighborhood levels. Figure 4.2 shows that spatial poverty is higher among younger children; thus the share of children who are poor and reside in areas of concentrated poverty is 21.8% for children aged 0 to 5, 21.4% for children aged 6 to 13, and 18.3% for children aged 14 to 18. Spatial poverty at younger ages contrasts to spatial poverty among the young and adult population. In fact, spatial poverty rates are 10.3% for young people aged 19 to 24 years old and 12.9% for the adult population older than 24 years old.

Figure 4.2 Santiago: Spatial poverty in cohorts, 2002



Source: Census, 2002

4.3 VOUCHER SYSTEM AND THE GEOGRAPHY OF EDUCATIONAL OPPORTUNITIES

Chile is one of the few countries that have implemented the voucher system in education. In doing so, Chilean authorities have closely followed the suggestions of Milton Friedman (1955, 1962). Thus, since the educational reform in the early 80s, every child—regardless of his/her socioeconomic status—has had the right to use a voucher in order to finance education in any of the schools within the system. Nowadays, the voucher is actually used by almost 90% of children in the country.

4.3.1 School Segregation

The educational voucher generates a school-choice educational system that seeks to increase the variety of alternatives available to the families. As argued by Friedman (1955), the voucher provides equal opportunities to all children, regardless of their individual and household characteristics.[64]. Theoretically, the voucher provides incentives for the schools to behave under a *profit seeking* rationale: while neither the resources nor the students are guaranteed, the schools need to "compete" for financial resources. Accordingly, schools have incentives to attract the ideal number of students that maximize the use of resources and that increase the school's reputation. As a result, families end up "sorted" between the different schools, according to their preferences as consumers.[65]

When attracting a mass of suppliers from the private sector, the educational reform generates a threefold system for providing education. On the one hand, the local governments or municipalities provide public education. On the other hand, the private sector provides education in two modalities: subsidized education and private non-subsidized education. The latter are the schools opting out from the voucher system. This sector is financed exclusively via private investment. In what follows, I will refer to these schools as public, private subsidized, and private non-subsidized schools respectively.

The design of the educational subsidy is aimed at generating equal conditions for competition (Matte and Sancho, 1991) which would benefit parents and schools. The educational authorities of the 80s expected that both public and private suppliers would act rationally and that in the competition process, the quality of education would increase

[64] Ultimately, parents should have a wide array of schooling alternatives; the main source of formal education should be the private sector, which is assumed to be superior in terms of quality and efficiency.
[65] Theoretically, since in the voucher system the money "follows the child" the latent threat of consumers' "exit" (Hirschman, 1970) should force schools to maximize the quality of education. This way schools should be able to guarantee the desired level of enrolment and, —therefore,—funds.

in all types of schools. In this scenario, families would sort themselves among different types of schools, according to their preferences. Nevertheless, the evidence shows that the socioeconomic status of the household is significantly related to the type of school the children attend. Table 4.6 shows that, in 2002, the majority of low SES children attended public schools whereas most of the middle class children attended private subsidized schools. Similarly, 97% of high SES children chose to forego the benefit of the subsidy, attending non subsidized private schools.

Table 4.6 Metropolitan area of Santiago: School enrolment in 4th grade, 2002

Type of School	**Socioeconomic Status**					**Total**
	Low		**Middle**		**High**	
	E	D	C2	C1	ABC1	
Public	75.0	76.2	32.0	14.8	…	39.7
Private Subsidized	25.0	23.8	68.0	78.8	2.8	48.9
Private Non-Subsidized	…	…	…	6.4	97.2	11.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: SIMCE, 2002

Socioeconomic segregation of the educational system becomes evident when we observe that there are no high SES children using the voucher in a public school and that less than 3% of them use the voucher in a private subsidized school. At the same time, not a single child of low or even middle SES can afford to reject the voucher. Thus, educational outcomes show a clear gap between types of schools. Table 4.7 shows that, in 2002, the average 4th grade math score is considerably lower in public schools as compared to the average score observed in private subsidized and non-subsidized schools. In fact, test results in public schools are below the national average by almost

eight percentile points, while test scores in private non-subsidized schools are almost 16% higher than the national average.

Table 4.7 Metropolitan area of Santiago: Average math scores, 2002

Type of School	Enrolment	SIMCE	
		Score	Index
Public	39.7	231	92.1
Private Subsidized	48.9	252	100.5
Private Non-Subsidized	11.4	291	115.9
Total	100.0	250	100

Source: SIMCE, 2002

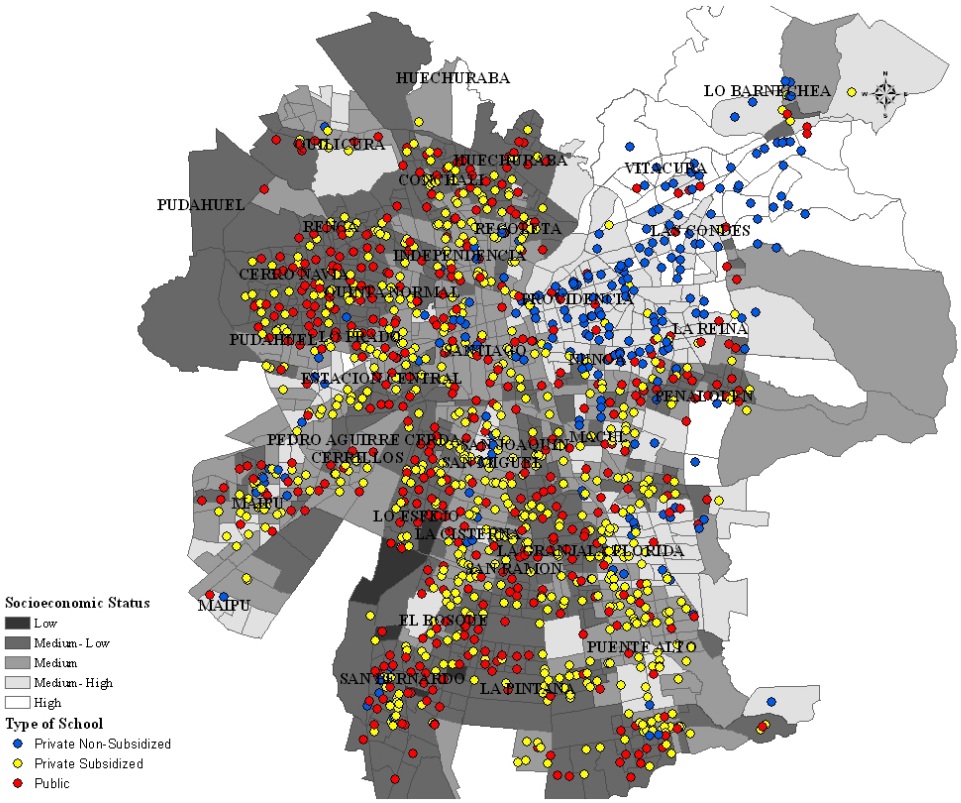
4.3.2 Geography of Opportunities

In the context of the voucher system, the ability of parents "to choose" the school of their preference is extremely relevant. In theory, parents face no restrictions to the range of alternatives, but the decision of the school is to accept (opt-in) or not accept (opt-out) the voucher as a valid form of payment. However, the freedom of choice allowed by the voucher is not the same for all parents.

In spatial terms, when choosing education, families can move freely from one district or neighborhood to another. This way—unlike in the U.S.A—the spatial distribution of schools or geography of educational opportunities becomes theoretically secondary. The fact that a certain district does not have a sound supply of educational opportunities is not necessarily relevant since parents are allowed to choose schools outside the limits of the neighborhood. In practice however, mobilization costs—time and transportation—make the geography of educational opportunities an extremely important restriction.

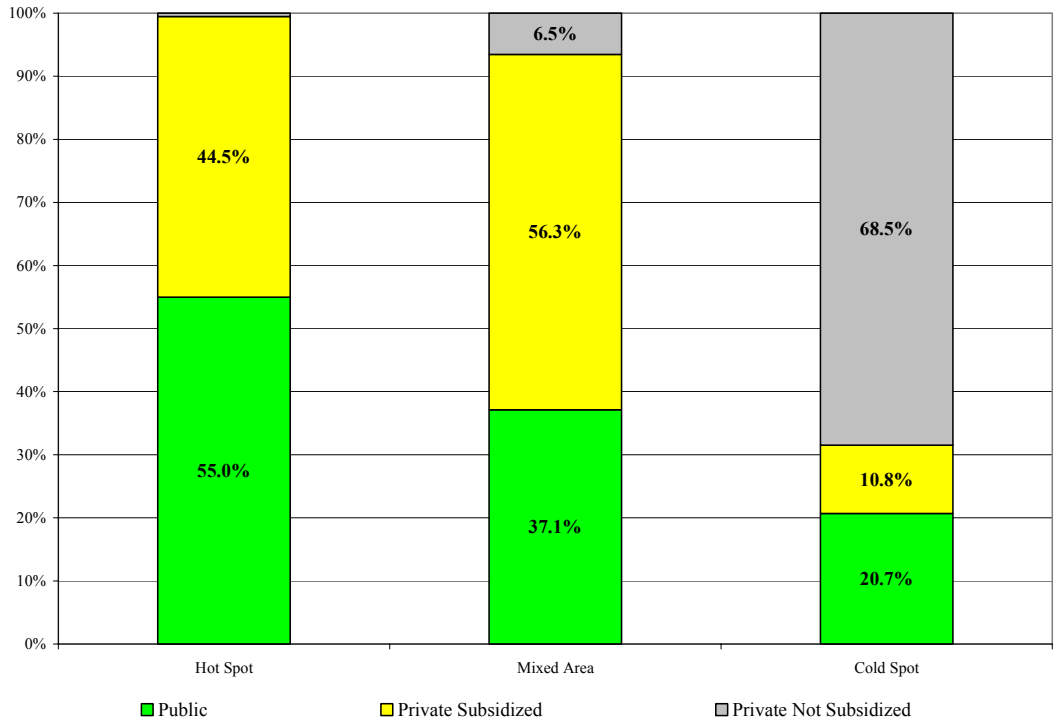
Map 4.3 shows the average census block's socioeconomic status and the spatial distribution of the different types of schools—public, private subsidized and private non-subsidized. Lighter colors represent higher average SES, in zones that are mainly located towards the northeast. Low income areas—represented in darker colors—tend to concentrate in the municipalities of Renca and Cerro Navia in the northwest and La Pintana in the south. Similarly, educational supply is spatially segregated. Red dots represent private non-subsidized schools, which are located, for the most part, where the middle and upper classes reside. At first glance, private subsidized and public schools—yellow and red dots respectively—seem to be more homogenously distributed in space. Nonetheless, there are some zones—where the very poor reside—where there are mostly public schools and almost no private education supply.

Map 4.3 Metropolitan area of Santiago: Socioeconomic status and location of schools



Source: Census, 2002; SIMCE, 2002

Figure 4.3 Enrolment per type of school and spatial socioeconomic segregation, 4th grade 2002.

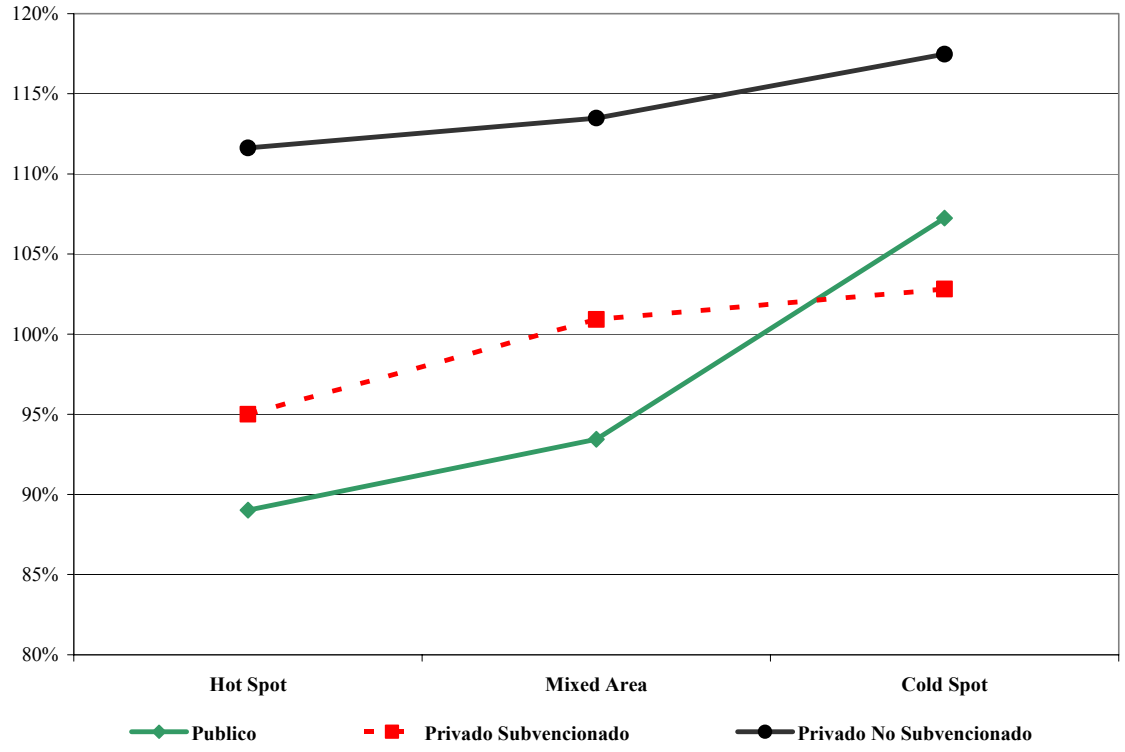


Source: Census, 2002; SIMCE, 2002

In fact, both the type of school supply and educational outcomes noticeably differ between segregated and non-segregated areas. Figure 4.3 shows that in segregated areas or hot spots (see map 4.2 above) 55% of school enrolment in 4th grade corresponds to public education, which is considerably high, considering that public education represents 37% in mixed areas and around 21% in areas where wealth is concentrated (cold spots). By contrast, private schooling has a relatively low participation in segregated areas (hot spots). While 80% of enrolment in cold spots corresponds to private education—either subsidized (10.8%) or non-subsidized (68.5%)—this number decreases to 45% in

segregated areas of hot spots. Note that private non-subsidized enrolment in hot spots corresponds to a negligible 0.5%.

Figure 4.4 Math scores per type of school and spatial socioeconomic segregation, 4th grade 2002.



Source: Census, 2002; SIMCE, 2002

Poor families that cannot afford to move from one district to another are restricted to the available local supply of schools. Since the geography of opportunities is related to the socioeconomic status of the area, the inability to carry out the right to "choose" is closely related to the level of residential segregation of the districts where the poor reside. Moreover, the “capture” behavior of the private subsidized schools prevents all families from having the same ability to choose a school, which triggers a sorting of families

according to their socioeconomic status. In this sense, the model of free market education is "geographically naive and therefore socially regressive"(Pacione, 1997), in the sense that it does not solve the difficulties faced by the residents of segregated areas.

Similarly, educational outcomes differ from one neighborhood to another. Figure 4.4 shows the distribution of math scores in different types of schools located in different types of neighborhoods as a percentage of the total average. In general, private non-subsidized schools have better educational outcomes than do private subsidized and public schools. Although the gap remains, regardless of the level of residential segregation of the neighborhood, it is true that all types of schools in segregated areas (hot spots) have lower academic results than schools in mixed areas. Moreover, schools in mixed areas have lower educational outcomes than schools in areas of concentration of wealth (cold spots). Interestingly, being located in a cold spot is relatively more beneficial for public schools than for private schools.

Chapter 5: Spatial Dependence and Spatial Heterogeneity in Education

The consequences of socioeconomic segregation on students' educational outcomes can be analyzed from two perspectives. The first perspective refers to the idea that the spatial context where children grow and learn is associated with a particular geography of opportunities and with a particular kind of socialization. This means that the neighborhood's physical and cultural characteristics explain, in part, why some children have better educational outcomes than others and also why some inputs in the education production function are more effective in some settings than in others. The second perspective is based on the idea that the spatial context in which children grow and learn is not isolated from the more distal context. In this sense, this second perspective focuses on the hypothesis that the particular kind of socialization triggered by the particular characteristics of the neighborhood spread from one community to another, based on spatial proximity. These two ideas or perspectives correspond to the spatial processes known as spatial heterogeneity and spatial dependence, respectively.

Although spatial heterogeneity and spatial dependence are conceptually related, both processes provide a different approach regarding the problem of the consequences of spatial concentration of poverty on children's educational outcomes. While spatial heterogeneity allows us to evaluate the variability of educational processes in different parts of the urban space, spatial dependence accounts for the way in which spatial proximity brings about contagion of behavior among individuals and institutions within communities located in different parts of the urban space. In practice, spatial heterogeneity in education means that the parameters in the education production

function actually vary from place to place. Spatial dependence in education means that educational outcomes in one particular place are affected by educational outcomes or some of their predictors in places nearby.

The approach adopted in this research measures the processes of spatial heterogeneity and spatial dependence. Thus, this research recognizes that, while educational processes differ from one neighborhood to another, the neighborhood is not a closed system isolated from the rest of the urban area, but a spatially interrelated part of a broader social system (Park et al, 1967).

Strictly speaking, since both processes occur at the same time, they should be estimated simultaneously. The statistical packages used in this research are not able to handle this task; [66] hence, this research adopts Morenoff's (2003) two-step procedure that allows approximating a spatial model that controls for the spatial heterogeneity process. As explained in Chapter 3, this two step procedure is an approximation of a spatial hierarchical model. The first step is aimed at estimating a neighborhood level measure of the dependent variable—educational outcomes—using coefficients from a three-level model of students nested in schools that are nested in neighborhoods, and that does not include any covariate at the neighborhood level. In the second step spatial models are developed in order to estimate the form and magnitude of the process of spatial dependence in education. In the latter step the dependent variable is created from the results of the multilevel model in the former step; thus, spatial dependence is measured using a dependent variable that is clean from the confounding effects of lower levels of analysis and thus, clean from the problem of spatial heterogeneity. In this sense, this model is an approximation of a spatial-hierarchical model.

[66] HLM, GEODA and R. Statistical packages aimed at handling multilevel and spatial models developed by S. Raudenbush and Luc Anselin and their teams respectively.

This chapter is organized in two main parts. The first one describes the development and main results of the multilevel models aimed at measuring spatial heterogeneity. The second section presents the main findings from spatial models.

5.1 SPATIAL HETEROGENEITY

The model implemented in the analysis estimates students' educational outcomes as a function of individual, household, school, and neighborhood characteristics.[67] Educational outcomes are provided by the National System for the Measurement of the Quality of Education (SIMCE). This is a standardized test applied nationally and periodically to the 4th and 8th grades of primary school and to the 2nd year of secondary school—or 11th grade. As explained in Chapter 4, the analysis is based on math test scores of 4th grade students who are enrolled in schools located in the metropolitan area of Santiago. The reason for choosing math test scores is that comprehension of mathematics relies more heavily on school quality, whereas language learning is more dependent on household characteristics. This is important due to the fact that neighborhood effects are likely to be correlated with household effects. Thus, multicollinearity between the characteristics of these two levels of analysis is less likely to appear in the analysis of math scores as compared to the analysis of language scores.[68]

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[67] That is, in this research I adopt a type of input-output approach (Averch et al, 1972) where the main question refers to the variations in educational outcomes associated with variation in resource levels. Concentration of poverty is considered as an additional resource that negatively affects educational outcomes. There are other approaches in the analysis of educational achievement, such as the experiential, organizational, evaluation, and the process approaches that seek to understand and explain other types of educational dependent variables. The strategy adopted in this research by no means implies that the effect of the spatial concentration of poverty is only measurable for educational outputs. In fact, I would argue that socioeconomic segregation of the poor is also consequential for children's personal experience, school structure, etc.

[68] Nonetheless, the results suggest that there is still some selection bias of households within schools and of schools within neighborhoods. In fact, unbalanced geography of opportunities links school characteristics to neighborhood characteristics; thus, the analysis of math scores rather than language scores is more likely to suffer from multicollinearity between levels 2—school—and 3—neighborhood.

The reason for choosing 4th graders—as opposed to 8th or 11th graders—is that it is expected that small children are more dependent on their mothers for mobility. Thus, small children are more likely than adolescents to be spatially confined to their residential neighborhood. This assumption leads to the belief that small children are more exposed to the local geography of opportunities and to the particular kinds of socialization in their neighborhoods, and less exposed to these features in other neighborhoods. In this sense, limited exposure to multiple contextual realities facilitates the measurement of the neighborhood effects.

5.1.1. Neighborhood effects and the voucher system

In the context of a voucher educational system, the analysis of the neighborhood effects on education becomes problematic. Households are located in a neighborhood that—due to the nature of the education system—does not necessarily correspond to the neighborhood in which the school is located. In other words, when the educational system fosters parental choice of schools and does not require children to be enrolled in the local neighborhood school, children are likely to be mobile between neighborhoods. In this case, the probability that children are exposed to different contextual factors interferes with the measurement of the "neighborhood effects".

Due to the possible discrepancy between household and school neighborhoods, this research introduces the categories of “daytime” and “nighttime” segregation. These categories are helpful to distinguish the neighborhood effects that come from the household’s neighborhood—nighttime neighborhood effects—from the neighborhood effects that come from the school’s neighborhood—daytime neighborhood effects.

Due to data restrictions it is not possible to compute daytime and nighttime neighborhood effects using equivalent spatial units. In fact, the National System for the

Measurement of the Quality of Education (SIMCE) does not provide household location with the same detail as the location of the school: while schools can be mapped exactly at the point in which they are located, households can only be located within the boundaries of a municipality. This is very common in order to protect students' confidentiality. Thus, in terms of measuring the nighttime neighborhood effects, the best we can do with the available data is to measure the effect of residing in a particular municipality with a particular level of socioeconomic residential segregation. However, a municipality is too large to be considered a neighborhood; thus, the data allows the estimation of daytime neighborhood effects only.

Fortunately, it is likely that daytime and nighttime neighborhood effects are rather similar. The evidence shows that, among children in primary education within the city of Santiago, the average distance between the household and the school is around 0.7 miles (República de Chile, Ministerio de Planificación y Cooperación, 1998; p. 112). This distance is considerably smaller than the distances that correspond to students in secondary and tertiary education: 2.2 and 4.8 miles respectively. Considering that the average diameter of a neighborhood—census district—is 0.9 miles, we can argue that, in spite of the possibility of choosing schools outside the limits of the neighborhood, children in primary education are more likely to enroll in a school that is located either within their residential neighborhood or within a neighborhood that is adjacent to it. In other words, the coincidence between the daytime and the nighttime neighborhood increases the chances for overlap in daytime and nighttime neighborhoods effects on the educational outcomes of children in primary education.

Nevertheless, average home-to-school distances for children in primary education are not the same in all types of neighborhoods. While distance from household to school is not significantly correlated with local school enrolment supply (op. cit, p. 117) there is

a positive and significant correlation between distance from home to school and the average income in the municipality.[69] In fact, average home-to-school distances are larger in high income municipalities than in lower income ones. Households located in municipalities where cold spots concentrate show an average distance from home to school of more than 1.25 miles (see the municipalities of Lo Barnechea, Las Condes, La Reina and Vitacura in map 4.2). On the other hand, the average distance from households to school in the municipalities where hot spots concentrate (La Pintana in the south and Cerro Navia and Renca in the north) is 0.5 miles. As expected, this evidence means that households travel longer distances if they are able to afford higher transportation costs associated with choosing a school that is farther away from the household. Although households located in high income municipalities travel longer distances, 69.4% of the time these trips end in the same part of the city: the cluster of municipalities where cold spots concentrate (op cit, p. 50).[70]. In contrast, households located in neighborhoods of concentrated poverty or hot spots are more likely to remain in the same neighborhood when making schooling decisions. This evidence indicates that there is no difference between daytime and nighttime neighborhood effects, at least for children in households located in neighborhoods that can be classified as hot spots or as cold spots.

In brief, we can argue that daytime and nighttime neighborhood effects are rather similar due to the fact that households located in low income areas tend to choose local schools, whereas households located in high income areas choose schools located in areas of similar socioeconomic composition. Thus, since data is restricted, this research

[69] The Spearman correlation coefficient between average distance from home to school and average household income in the municipality is 0.68 with a p-val<0.01.

[70] This percentage corresponds to the ratio between household—school travels within the eastern part of the city and the total household—school travels that start in the east. This ratio includes all travels among all levels of education. It is likely that if we include primary education only, this ratio would significantly increase.

measures only daytime neighborhood effects under the assumption that nighttime neighborhood effects are not very different. [71]

5.1.2 Multilevel Education Production Function

A three-level education production function is used in order to estimate the effects of spatial concentration of poverty on educational outcomes. A multi-level or hierarchical linear model (Roudenbush y Byrk, 2002) allows estimating an education production function while controlling for heterogeneity in nesting units of analysis. In other words, a model as such recognizes that the learning processes vary from school to school and from neighborhood to neighborhood depending on the characteristics of these nesting units.

Based on previous research about the determinants of educational outcomes in the context of the Chilean voucher system in education (see among others Gallego, 2002; Mizala and Romaguera, 2000; Mizala, Romaguera and Ostoic, 2004), educational outcomes are estimated using a nested model of 4th grade students (level-1) that attend schools (level-2) that, in turn, are located in the different neighborhoods of the city of Santiago (level-3). This model estimates the effects of individual, school, and neighborhood characteristics on educational achievement, allowing for the existence of school and spatial heterogeneity.

5.1.2.1 Level-1: Students and Households

The multilevel education production function includes the following covariates at the school and household level: sex—hypothetically, boys perform better in math

[71] Actually, Chapter 4 provides evidence of large scale segregation, which means that poor neighborhoods are located far away from wealthy neighborhoods. Poor children may cross one or two adjacent neighborhoods to go to school but they are not expected to cross the entire city to access schools located in wealthy neighborhoods. The same holds for wealthy children in wealthy neighborhoods.

whereas girls perform better in language—household income, level of education of the adults in the household, preschool attendance, and grade failure in the past. In addition, covariates at level-1 include two important variables that can be understood as a proxy of the way in which socialization in the household can be more or less beneficial for educational outcomes. It is expected that living with both parents—as opposed to living with only one parent or neither of them—provides role models to children that can be translated into higher test scores. Additionally, it is expected that parent's expectations about future educational achievement of their children have a real effect on children's educational outcomes. Since parents are likely to have higher expectations for those children who do better in school than for those who do worse, the latter covariate is endogenous to educational outcomes. As will be explained shortly, I use instrumental variables in order to correct for this problem.

Table 5.1 shows the descriptive statistics for the individual and household variables in the model. The first three rows describe the continuous variables in the model. The dependent variable—math test scores—shows a mean of 251.5, a standard deviation of 53.9, a minimum of 94, and a maximum of 397. Figure 5.1 shows that the dependent variable in the model is fairly normally distributed around these parameters. The natural logarithm of the household income per capita has a mean of -0.66, a standard deviation of 0.79, a minimum of -4.47, and a maximum of 2.56. Figure 5.2 shows peaks in the distribution of the natural logarithm of the household income per capita. This is due to the fact that data availability in the survey for this variable is computed as the natural logarithm of the ratio between income brackets and the number of persons in the household.[72]

[72] Income brackets in thousands of Chilean pesos are: 1 = under 100; 2 = between 100 and 200; 3 = between 200 and 300; 4 = between 300 and 400; 5 = between 400 and 500; 6 = between 500 and 600; 7 = between 600 and 800; 8 = between 800 and 1,000; 9 = between 1,000 and 1,200; 10 = between 1,200 and 1,400; 11 = between 1,400 and 1,600; 12 = between 1,600 and 1,800; 13 = over 1,800.

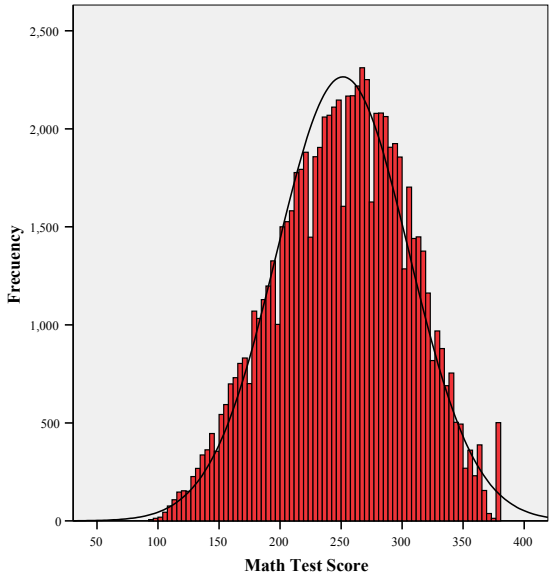
Table 5.1 Descriptive statistics, main variables at the individual and household level.

VARIABLE NAME	MEAN	SD	MIN	MAX
MSC: Math Test Score	251.5	53.9	94	379
LNINC: Household Income per capita (ln)	-0.66	0.79	-4.47	2.56
AED: Average years of education (adults)	11.39	3.15	0	23
NOF: 1= No grade failure in the past, 0= otherwise	0.91	0.29	0	1
M: 1= boy, 0= girl	0.51	0.50	0	1
BPR: 1= Child lives with both parents, 0=otherwise	0.71	0.46	0	1
PSC: 1= attend pre-school; 0= otherwise	0.52	0.5	0	1
$\hat{E}$: Parent's expectations (adjusted)	0.64	0.22	0.07	0.99

Source: SIMCE, 2002 (N= 66,565)

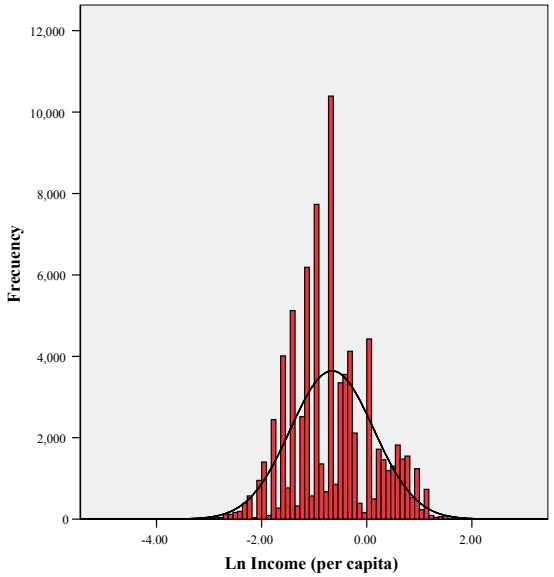
The third row in Table 5.1 describes the distribution of the average years of education among adults in the household. This covariate shows a mean of 11.4 years, a standard deviation of 3.2, a minimum of 0, and a maximum of 23 years. As shown in figure 5.3, this variable follow a leptokurtic distribution inasmuch as values around the average are more common than what a normal distribution would predict.

Figure 5.1 Math test scores from National SIMCE, 4th graders 2002.



Source: SIMCE, 2002

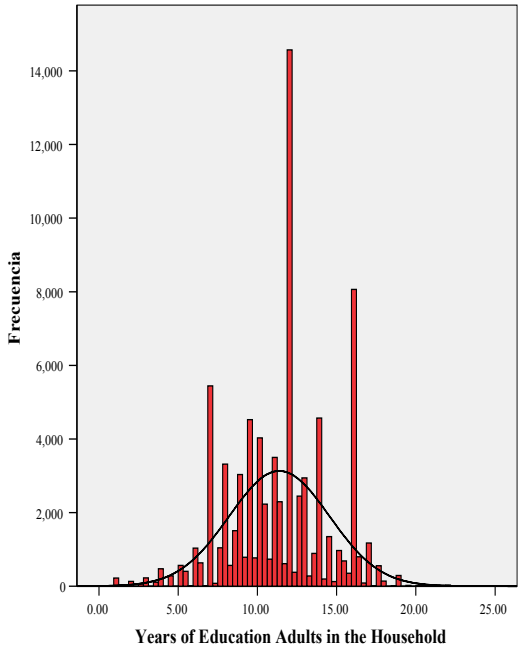
Figure 5.2 Household income per capita (ln), 4th graders 2002. [73]



Source: SIMCE, 2002

[73] As shown above, the peaks in the distribution are due to the fact that data availability in the survey only allows approximating income as the natural logarithm of the ratio between 13 income brackets and the number of persons in the household.

Figure 5.2 Average years of education of adults in the household, 4th graders 2002.



Source: SIMCE, 2002

The last four rows in Table 5.1 describe the distribution of the categorical level-1 variables introduced in the multilevel education production function. As shown in the 4th row of Table 5.1, 91% of 4th graders in 2002 had never failed a grade in the past; 51% are boys, 71% live with both parents and 52% had attended either one or two years of pre-school.

The last row in Table 5.2 shows the adjusted probability that parents expect their children to reach at least some years of post-secondary education. Since parents' expectations about future educational achievement are likely to depend upon current educational outcomes, the inclusion of untreated parental expectations in the model means the inclusion of an endogenous variable that may disturb the results.[74] Therefore, instead of introducing observed parental expectations in the model, instrumental variables are used to estimate adjusted parental expectations. Instrumental variables, are significantly correlated with other covariates in the model, but do not show a significant correlation with the error term obtained from the equation, that includes all level-1 variables.[75]

The instruments for the estimation of parental expectations are the level of household expenditure on education other than tuition and fees, and an index of availability of resources for studying and doing homework; resources such as books, computers, internet, etc. These instruments are used to construct an adjusted indicator of expectations. In order to do so, I run a logistic regression of parental expectations,

[74] Since the Hausman test fails to meet the asymptotic assumptions (i.e. provides a negative Chi squared), I run a "suest" test (seemingly unrelated regressions) to test for systematic differences between the regression coefficients of the consistent and the inconsistent equations (i.e. equations that either do not or do include the endogenous variable of expectations). The "suest" test has a Chi squared of 1,610 with 10 degrees of freedom, which means that we reject the null hypothesis that the coefficients are roughly the same in both equations. Thus, including this endogenous variable has a significant effect of/on the coefficients (see appendix 2).

[75] See pair wise correlations in appendix 2.

including all the variables in the model and the instrument. Predicted expectations—rather than observed expectations—are fed into the multi-level models.[76]

5.1.2.2 Level-2: the Classroom and the School

As explained in Chapter 3, multilevel models allow the coefficients associated with each of the level-1 covariates to vary across nesting units. Variability of level-1 coefficients—both intercept and slopes—is explained by certain characteristics of the two further levels of analysis: the school and the neighborhood. In this sense, the second level of analysis estimates the effects of several schools' characteristics on children's educational outcomes. The main assumption is that students' test scores depend upon a number of characteristics of the classroom and the school.

School socioeconomic composition is important for average test scores. Since the survey provides five categories of the school's socioeconomic composition: low, medium-low, medium, medium-high, and high, the model includes four dummies, one for each of the first four categories. [77]

In the Chilean educational system, different types of schools created after the implementation of the voucher system—public, private subsidized and private non-subsidized schools—have significant differences in terms of school effectiveness and ultimately, in test scores. It was demonstrated in the previous chapter that academic performance is significantly worse in public schools than in private subsidized schools.

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[76] See appendix 2 for the Hausman test, the "suest" test and a complete report of the estimation of adjusted expectations.

[77] The National System for the Measurement of the Quality of Education groups schools into five categories of socioeconomic status. Three variables are used in order to classify schools into different socioeconomic statuses: the school's vulnerability index, the average number of years of education among parents and the average household income. The Vulnerability Index (IVE) is calculated by the JUNAEB, a Chilean public agency whose mission is to promote students' social protection (see www.junaeb.cl). This index provides the share of at risk students in the school. Parents' years of education and household income are obtained from the parents' questionnaire from the SIMCE.

Math scores in the latter are, in turn, significantly lower than math scores in private non-subsidized schools.[78]

In relation to the characteristics of the classroom, it is expected that teachers are a critical factor affecting children's learning. The institutional socialization hypothesis and the so-called "Pygmalion" effect in the classroom state that a teacher's expectations about the children's performance actually predict educational outcomes. The literature also suggests that a teacher's job satisfaction is positively correlated with educational outcomes. A classroom climate that is more learning-friendly also predicts better educational outcomes. Finally, the degree to which the school is able to engage parents in their children's education is expected to be positively correlated with educational outcomes.

Table 5.2 shows the main descriptive characteristics of the school and classroom covariates used in the model. The first two rows describe the distribution of two factors—computed via principal components—that provide a measure of the learning climate in the classroom and of the teacher's job satisfaction, respectively. The first factor is formed using three variables in which the teacher is asked to rate the class from 1 to 5 on the following items: attention, participation, and discipline. The Cronbach's alpha for this factor is 0.746 and the selected factor explains almost 67% of total variance.[79] Factor loadings are 0.86, 0.79 and 0.80 for the questions of attention, participation, and discipline, respectively, which means that higher values of the factor are related to a better learning climate in the classroom. Figure 5.4 shows that the factor follows a

[78] Previous research has found dissimilar evidence about whether these differences are driven by the social composition of schools or by the administrative characteristics associated with each type of school (see Gallego, 2002; Mizala and Romaguera, 2000; Mizala, Romaguera and Ostoic, 2004 among others).

[79] Cronbach's alpha assesses the reliability of a rating summarizing a group of test or survey answers which measure some underlying factors such as the classroom learning climate. Cronbach's alpha can be written as a positive function of the number of test items and the average intercorrelation among the items.

distribution that is slightly biased towards higher values—i.e. a better classroom climate.[80]

Table 5.2 Descriptive statistics, main variables at school level

VARIABLE NAME	MEAN	SD	MIN	MAX
LCC: Learning Climate in the Classroom	0	1	-4.74	1.44
TJB: Teachers' Job Satisfaction	0	1	-3.6	2.31
SFB: School-Family Bond	0	1	-4.41	2.41
P: 1= Public School; 0= otherwise	0.37	0.48	0	1
PS: 1= Private Subsidized School; 0= otherwise	0.47	0.5	0	1
LSES: 1= Low SES; 0= otherwise	0.01	0.1	0	1
MLSES: 1= Medium-Low SES; 0= otherwise	0.27	0.44	0	1
MSES: 1= Medium SES; 0= otherwise	0.42	0.49	0	1
MHSES: 1= Medium-High SES; 0= otherwise	0.16	0.37	0	1
TE: 1= Teachers have high expectations; 0= otherwise	0.59	0.49	0	1

Source: SIMCE 2002 (N= 2,202)

The second factor in the second row of Table 5.2 provides a measure of the level of the teacher's job satisfaction. This factor, as well as the previous one, is computed using principal components based on seven questions, in which teachers are asked to rate—from 1 to 4—their level of disagreement with the following statements: a) my job is exhausting; b) the environment in which the school is located is insecure; c) the division of responsibilities among teachers in the school is not very clear; d) the school does not have enough resources for me to perform my job; e) my salary is too low; f) I feel isolated in my job and g) if I could, I would quit my job. Besides, the factor includes the following question: "Taking into account all aspects in your job: how satisfied are you with your job in the school?". This question has possible answers from 1 to 7 that were recoded in a way that higher values reflect more satisfaction. Thus, positive

[80] What is most characteristic about this factor is that it does not follow a smooth distribution. On the contrary, due to the nature of the original variables composing the factor, decimals are far less common as compared to whole numbers.

correlations of each component with the factor reflect more satisfaction with the job. The scale that includes all the elements has a Cronbach's alpha of 0.733 and the factor loadings are all positive and higher than 0.5.[81] Figure 5.5 below shows that this factor follows a smooth, normal distribution.

The third row in Table 5.2 describes the distribution of an indicator of the contact between the school and the family. This variable is constructed by calculating the Z score of the percentage of parents that always or almost always attend school meetings.[82] On average, 68% of the school's parents always or almost always attend the meetings they organize, with a minimum of 11% and a maximum of 100%. Considering a standard deviation of 12.6% a Z score is constructed. Figure 5.6 shows the distribution of this variable.

Rows 4 and 5 in Table 5.2 describe the categories of type of school. The sample includes 37% of public schools, 47% of private subsidized schools, and 16% of private non-subsidized schools.[83]

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[81] Note that the exclusion of any of the components actually decreases the Cronbach's alpha. The factor analysis leads to 2 components of which I have selected the first one that explains almost 36% of the total variance. Factor loadings in this first factor are 0.5, 0.52, 0.68, 0.67, 0.57, 0.58, and 0.66 for questions a, b, c, d, e, f, and g. The question about general satisfaction has a factor loading of 0.58. The second factor explains 15% of total variance and is only positively correlated with question (b) about environmental security and slightly negatively correlated with the rest of the components.

[82] The parent questionnaire asks about the frequency of their school meeting attendance. Possible answers are: never, almost never, sometimes, almost always, and always.

[83] Since classroom size is larger in public schools than in private schools, the share of students per type of school is 38.6%, 39.8% and 11.5% in public, private subsidized and private non-subsidized schools respectively.

Figure 5.4 Factor: Learning Climate in the classroom, 2002.

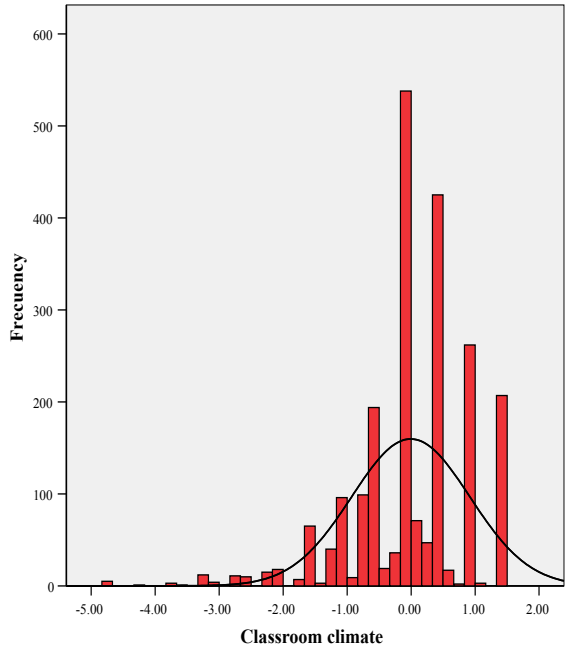


Figure 5.5 Factor: Teachers' Job Satisfaction, 2002.

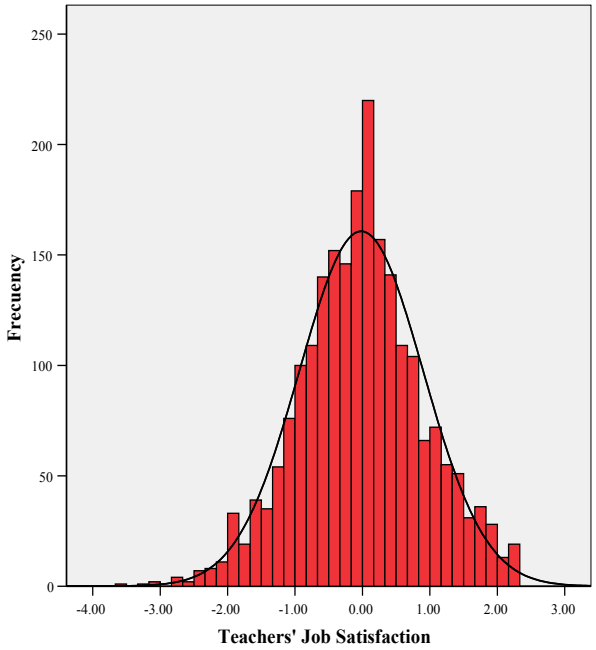
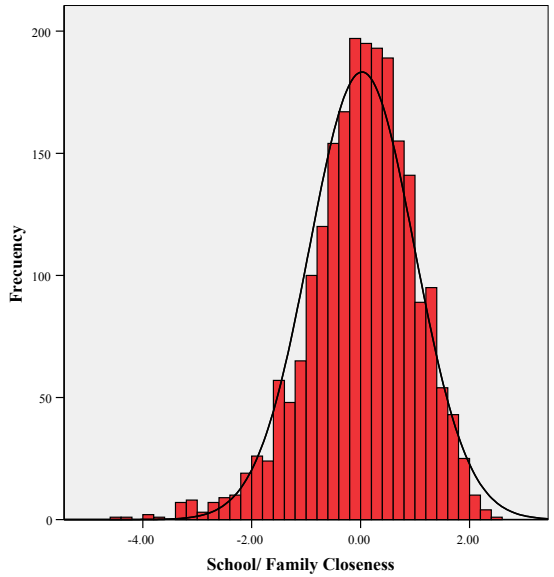


Figure 5.6 School-Family Bond, 2002.



Rows 6, 7, 8, and 9 in Table 5.2 describe the share of schools from different socioeconomic status. The sample includes only 1% of schools whose students have low socioeconomic status, 27% of schools with medium low socioeconomic status, 42% of schools with medium SES, 16% of schools with medium-high SES and 14% of schools with high SES.[84] Finally, the tenth row in Table 5.2 describes the covariate about teachers' expectations. This is a dichotomous variable that takes value 1 if the teacher believes that their student will reach at least some years of post-secondary, which corresponds to 59% of schools in the sample.

5.1.2.3 Level-3: the Neighborhood

At the third level of analysis, covariates are included in order to estimate the direct and indirect effects of neighborhood characteristics on educational outcomes; in particular, this level estimates the effects of spatial concentration of poverty on students' educational outcomes. The main hypothesis is that contextual poverty has a measurable effect on educational outcomes, above and beyond the effect of the school's and the student's characteristics. In order to test this hypothesis, the model includes three main variables at the neighborhood level: head of households' unemployment rate, average socioeconomic status index, and two dummies that indicate whether a neighborhood can be considered a hot spot, a cold spot, or a mixed area.

On average, there are 1.8 schools within each census zone. This number is not large enough to estimate robust fixed and random effects at level-3 [85] In fact, 80% of census zones have two or fewer schools, which presents difficulties for the estimation of a multilevel model that accounts for spatial heterogeneity. To overcome this problem,

[84] The share of students attending schools in each of these socioeconomic groups is 1.1%, 27.0%, 44.3%, 17.1%, and10.6% respectively.
[85] A robust model relaxes the assumption that variance within nesting units is constant.

level-3 is measured at the level of the census district where there are, on average, 4.1 schools in each spatial unit and only 30% of the census tracts present the problem of having two schools or fewer. Due to insufficient variability, the analysis excludes 92 districts, which means leaving out 13% of students, those attending the schools located in these neighborhoods. In the end, the multilevel models presented in the next section make use of data for 66,565 students, 2,202 classrooms, and 219 census districts or neighborhoods.

Table 5.3 Descriptive statistics, main variables at the neighborhood level

VARIABLE NAME	MEAN	SD	MIN	MAX
HHUR: Unemployment Rate (heads of households)	9.5	2.88	2.5	16.9
ZSES: Neighborhood's SES (Z scores)	0	1	-1.57	2.77
SEG: 1= Neighborhood is a Hot Spot; 0= otherwise	0.08	0.27	0	1
AFL: 1= Neighborhood is a Cold Spot; 0= otherwise	0.12	0.32	0	1

Source: SIMCE 2002 (N= 219)

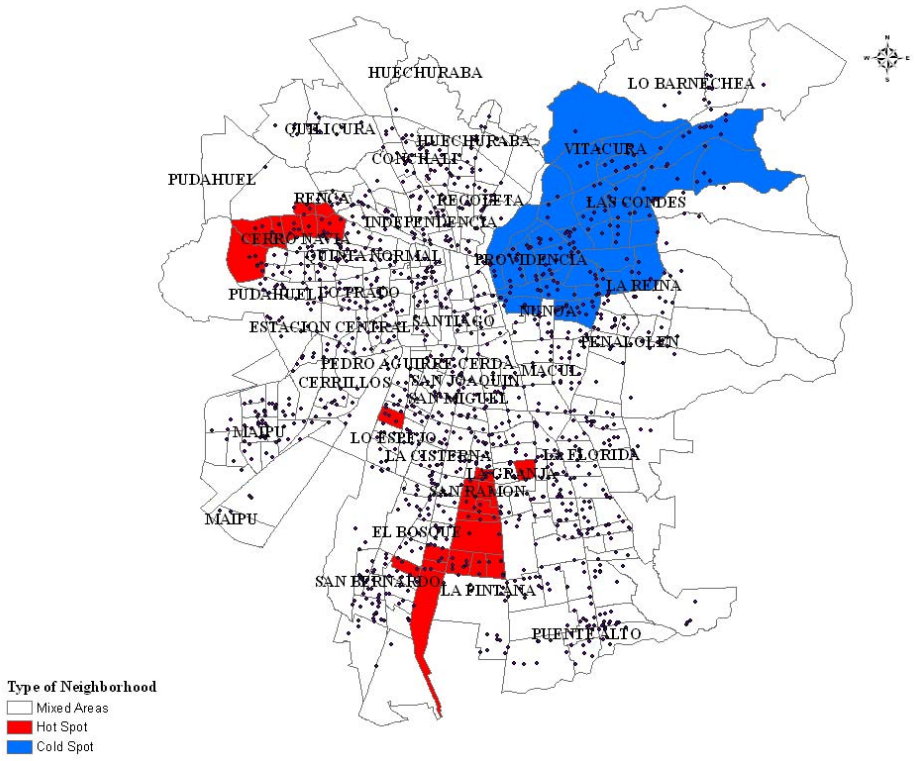
Table 5.3 provides the main descriptive statistics for the four variables included at the neighborhood level. The 219 districts considered in the analysis show, on average, an unemployment rate among heads of households of 9.5%. This rate has a minimum of 2.5% and a maximum of almost 17%.

As described in Chapter 4, the analysis makes use of a socioeconomic index in Z scores.[86] In addition to the socioeconomic status of the neighborhood, the model includes two dummy variables indicating whether an extreme level of socioeconomic status in the neighborhood is significantly and positively correlated with the socioeconomic status in

[86] For a description of this socioeconomic index, see Chapter 4.

the neighborhoods nearby.[87] Map 5.1 shows the districts in which a low socioeconomic index is significantly correlated with a low socioeconomic index in the surrounding neighborhoods. These are the hot spots, indicated in red, that represent 8% of the neighborhoods considered in the analysis. Similarly, blue neighborhoods are the cold spots or the neighborhoods with high socioeconomic status that are significantly surrounded by other neighborhoods with high socioeconomic index. These cold spots represent 12% of the districts considered in the analysis.

Map 5.1 City of Santiago: Hot Spots, Cold Spots, and Mixed Areas



Source: Census 2002.

[87] As described in the previous Chapter, this spatial autocorrelation is computed using the local Moran's I. Note that in addition to being a significant cluster of low or high socioeconomic index, a threshold was established in order to compute only the hot and cold spots at each of the extremes of the distribution. For details see Chapter 4.

5.1.3 The Models

The following set of equations describes the education production function of student "i" who is enrolled in school "j" that, in turn, is located in neighborhood "k". As explained in Chapter 3, the effects of the individual/ household inputs on math test scores are allowed to vary across schools (level-2) and neighborhoods (level-3), whereas the effects of school covariates are allowed to vary across neighborhoods. The equations depict the complete model that includes all the variables mentioned above. Individual/household and school level covariates are expected to have a direct effect on educational outcomes. Coefficients φ_{100}, φ_{200}, φ_{300}, φ_{400}, φ_{500}, φ_{600}, and φ_{700} estimate the direct effects of the individual characteristics on math test scores—income, education, grade failure, being male, living with both parents, adjusted parental expectations and pre-school attendance respectively. Coefficients φ_{010}, φ_{020}, φ_{030}, φ_{040}, φ_{050}, φ_{060}, φ_{070}, φ_{080}, φ_{090}, and φ_{0100}, estimate the direct effects of the school's characteristics on educational outcomes—type of school, socioeconomic status, learning climate in the classroom, teacher's job satisfaction, school-family bond and teacher's expectations, respectively.

Neighborhood characteristics are expected to have both direct and indirect effects on educational outcomes. Unemployment rate among heads of households is an indicator of the existence of role models in the neighborhood. A high unemployment rate reflects weak ties with the labor market among adults, which might affect children's socialization regarding the idea that educational achievement is critical for labor opportunities later in life. This effect is represented by coefficient φ_{003}.

Level-1

1) $MSC_{ijk} = \beta_{0jk} + \beta_{1jk} LnINC_{ijk} + \beta_{2jk} AED_{ijk} + \beta_{3jk} NOF_{ijk} + \beta_{4jk} M_{ijk} + \beta_{5jk} BPR_{ijk} + \beta_{6jk} \hat{E}_{ijk} + \beta_{7jk} PSC_{ijk} + \mu_{0jk}$

Level-2

2a)

$\beta_{0jk} = \gamma_{00k} + \gamma_{01k} P_{jk} + \gamma_{02k} PS_{jk} + \gamma_{03k} LSES_{jk} + \gamma_{04k} MLSES_{jk} + \gamma_{05k} MSES_{jk} + \gamma_{06k} MHSES_{jk} + \gamma_{07k} LCC_{jk} + \gamma_{08k} TJS_{jk} + \gamma_{09k} SFC_{jk} + \gamma_{010k} TE_{jk} + r_{0jk}$

2b) $\beta_{1jk} = \gamma_{10k} + r_{1jk}$

2c) $\beta_{2jk} = \gamma_{20k}$

2d) $\beta_{3jk} = \gamma_{30k}$

2e) $\beta_{4jk} = \gamma_{40k}$

2f) $\beta_{5jk} = \gamma_{50k}$

2g) $\beta_{6jk} = \gamma_{60k}$

2h) $\beta_{7jk} = \gamma_{70k}$

Level-3

3a) $\gamma_{00k} = \phi_{000} + \phi_{001} ZSES + \phi_{002} LAGZSES_j + \varphi_{003} HHUR_k + e_{00k}$

3b) $\gamma_{01k} = \phi_{010}$

3c) $\gamma_{02k} = \phi_{020}$

3d) $\gamma_{03k} = \phi_{030}$

3e) $\gamma_{04k} = \phi_{040}$

3f) $\gamma_{05k} = \phi_{050}$

3g) $\gamma_{06k} = \phi_{060}$

3h) $\gamma_{07k} = \phi_{070}$

3i) $\gamma_{08k} = \phi_{080} + \phi_{081} HS_k + \phi_{082} CS_k$

3j) $\gamma_{09k} = \phi_{090} + \phi_{091} HS_k + \phi_{092} CS_k$

3h) $\gamma_{010k} = \phi_{0100}$

3l) $\gamma_{10k} = \phi_{100}$

3m) $\gamma_{20k} = \phi_{200}$

3n) $\gamma_{30k} = \phi_{300}$

3o) $\gamma_{40k} = \phi_{400}$

3q) $\gamma_{50k} = \phi_{500} + \phi_{501} HS_k + \phi_{502} CS_k$

3r) $\gamma_{60k} = \phi_{600}$

3s) $\gamma_{70k} = \phi_{700}$

where $\mu_{ijk} \sim N(0, \sigma^2)$, $r_{0jk} \sim N(0, \tau_{00})$, $r_{1jk} \sim N(0, \tau_{11})$, and $e_{0jk} \sim N(0, \tau_{000})$

While coefficient φ_{001} estimates the direct effect of the neighborhood's socioeconomic status on educational outcomes, coefficient φ_{002} estimates spatial externalities. In other words, the latter coefficient provides the effect of the socioeconomic status in the adjacent neighborhoods on educational outcomes in the target neighborhood. In this sense, this complete model can be understood as a hierarchical spatial cross-regressive model (see Chapter 3).[88]

Concentration of poverty per se—as opposed to the socioeconomic status within the boundaries of the neighborhood—is expected to have indirect effects; outcomes which might take three forms. It is expected that institutional socialization is different in isolated neighborhoods; thus, equations 3i and 3j suggest that concentration of poverty and concentration of wealth measured in the dummy variables HS and CS explain the variations in the effects of both characteristics of the classroom, school-family bond (SFB) and teachers' job satisfaction (TJS) on educational outcomes. The effect of concentration of poverty on these slopes—or sensibility of educational outcomes to each of these classroom's covariates—is given by the coefficients φ_{081} and φ_{091} respectively. Similarly, the effect of concentration of wealth on these slopes is reflected in coefficients φ_{082} and φ_{092}.

Furthermore, it is expected that norms and values in the household are different and thus have different effects on educational outcomes in different types of communities. Thus, equation 3p indicates that the effect of living with both parents is different in hot spots from the effect in mixed areas by an amount of φ_{501}. The effect of living with both parents is also expected to be different in cold spots by an amount of φ_{502}.

[88] Since the model cannot be tested for spatial autocorrelation in the error terms, this is only a partial explanation of spatial dependence. A more exhaustive measurement of spatial dependence is performed in the next section of this chapter.

In addition to the fixed effects—direct and indirect—there are a number of random or unobserved characteristics of the students and their families, the schools and the neighborhoods that also affect educational outcomes. When significant, coefficients τ_{00} and τ_{000} indicate that, after controlling for all the variables in the model, there is an unexplained portion of the students' scores that randomly varies between schools and between neighborhoods respectively. These coefficients indicate the degree of heterogeneity at level-2 and at level-3. In addition, slopes can vary randomly across their respective nesting unit. For instance, the effect of any level-1 covariate can vary randomly across schools or across neighborhoods. Similarly, the effect of any level-2 covariate can vary randomly across neighborhoods. In our models, we find it significant that the effect of household income on educational outcomes randomly varies between schools (see random element in equation 2b). The degree of this random variation is estimated in coefficient τ_{11}.[89]

In all, the complete three-level model in the equations presented above includes twenty-seven fixed effects and four random effects. Fixed effects are the intercept, seven individual level effects, ten school level effects, three direct neighborhood level effects, four cross-level effects or interactions between the neighborhood and the school levels, and two cross level effects between the neighborhood and the individual/household levels. The latter nine effects can be interpreted as the fixed, observed neighborhood effects. Random effects correspond to the within school variance—or the traditional σ^2—the between schools variance (τ_{00}), the between neighborhood variance (τ_{000}), which can be interpreted as an unobserved neighborhood effect, and the between school variance of the effect of household income (τ_{00}). [90]

[89] Other random slopes were tested, such as the effects of parental expectations and teachers' expectations. None of these effects turned out to be significant.

[90] Even though within school variability is assumed constant, the results presented in this research are robust to heteroskedasticity.

5.1.4 Main Results

The estimation of the education production function starts with the fully unconditional model, also called the ANOVA model, since it is aimed at estimating within and between variance components without including any explanatory variable. This null model is useful for confirming that the estimation technique is adequate. In other words, significant variance coefficients at level-2 and level-3 suggest that there is a degree of school heterogeneity and spatial heterogeneity that needs to be accounted for.

The null three-level model of students' math test scores nested in schools that are, in turn, nested in Santiago's neighborhoods or census districts, provides a mean of 252.7. The scores' deviation from this grand mean is partitioned into three random components that correspond to the error terms in each of the three levels in the analysis. Total variance in the model corresponds to the sum of the variance of these three error terms. The variance at level one is estimated at 1,976.9, whereas variances at the school and neighborhood levels are estimated at 515.4 and 485.8 respectively. The latter two parameters turn out to be statistically significant with a p-value<0.01. This means that 17.3% of the model's variance is explained by school characteristics, whereas 16.3% of it is explained by neighborhood characteristics. The rest of the model's variance (66.4%) is explained by individual and household characteristics.

Thus, the first finding worth highlighting is that there is an important and significant "neighborhood effect" explaining educational outcomes. This effect is almost as important as the school effect, inasmuch as it accounts for more than 16% of the students' test scores variability and it is short of what a school is able to explain by only one percentage point. The following models include additional variables that are expected to explain part of this variability.

The effects of spatial concentration of poverty on educational outcomes need to be estimated net of the effects of poverty itself. Thus, in the first place indicators of socioeconomic status at the household, school, and neighborhood levels are included in the three-level education production function. Table 5.4 shows the result of including, in a sequence, the neighborhood's socioeconomic status, the household income, and the school's socioeconomic status as explanatory variables of students' math test scores. Model 1 includes the Z scores of the average socioeconomic index in the neighborhood where the school is located. According to this model, one additional standard deviation of socioeconomic status in the neighborhood significantly increases math test scores by 18.45 points.

Table 5.4 Education production function: income models. Fixed Effects

	Model 1		**Model 2**		**Model 3**	
	Neighborhood SES		**Neighborhood, Household SES**		**Neighborhood, Household, School SES**	
Intercept	252.31	***	258.55	***	292.79	***
Neighborhood's SES (ZSES)	18.45	***	13.87	***	1.71	**
School's SES /a						
Low (LSES)					-72.54	***
Medium-Low (MLSES)					-57.53	***
Medium (MSES)					-37.38	***
Medium-High (MHSES)					-18.22	***
Household Income (LnINC)			9.84	***	8.10	***
Deviance	*633,810*		*632,580*		*631,843*	
MLE	*200*	***	*1,230*	***	*738*	***
df	*1*		*1*		*4*	

a/ Reference category is high SES. Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1

Self-selection of residents in a particular neighborhood may well mean that the effect of the neighborhood's socioeconomic status (SES) on math test scores is actually capturing the effect of household SES. Thus, in the next model we test whether the effect of the neighborhood's SES remains significant after including an indicator of the household SES. Model 2 includes, in addition to the neighborhood SES, the natural logarithm of the per capita income in the household. According to this model, one additional percent of household income significantly increases test scores by 9.84 points. The effect of neighborhood SES decreases from 18.45 to 13.87 points. Nonetheless, it remains statistically significant. Moreover, in model 2 the effect of neighborhood SES appears to be more important than the effect of household income. In fact, standardized coefficients are 0.26 and 0.14 respectively.[91]

The high level of school segregation in Chile implies that families sort themselves into schools with certain characteristics. On the other hand, a segmented geography of opportunities implies that there is a high probability that the school's socioeconomic staus is positively correlated with the neighborhood's socioeconomic status. Thus, household income and the neighborhood's SES may well be capturing the effect of the school's SES on educational outcomes. Thus, model 3 includes a set of four dummies that control for the effect of belonging to a school of a particular socioeconomic group. According to this model, the lower the school's socioeconomic group, the lower the math test scores. Schools with low SES have on average 72.5 fewer points than schools with high socioeconomic status. Schools with medium-low SES have 57.53 fewer points than

[91] These comparable coefficients as calculated using the following formula: $\beta^{st} = \hat{\beta} * \sigma_x / \sigma_y$. The standard deviations of the dependent variable, the neighborhood SES and the natural logarithm of per-capita household income are 53.89, 1, and 0.79 respectively.

the reference category, whereas medium and medium-high SES schools have 37.38 and 18.22 fewer points than schools with high SES, respectively.

When including the effect of the school's SES, both the effect of household income and the effect of the neighborhood's SES remain statistically significant. However, while the effect of the former decreases from 9.84 to 8.10, the effect of the latter is dramatically reduced from 13.87 to 1.71. Standardized coefficients for the neighborhood's, the school's and the household's SES are 0.03, 0.27, and 0.12 respectively.[92] This means that when controlling for the socioeconomic status at the three levels in the analysis, the one that is most important for predicting educational outcomes is the school's SES; in second place there is the effect of household's SES and coming in at a distant third place is the effect of the neighborhood's SES. Nonetheless, this effect remains statistically significant.

The steep drop in the importance of the neighborhood's SES for explaining educational outcomes suggests that, while household and neighborhood socioeconomic statuses have distinguishable effects of educational outcomes, the effects of the school and of the neighborhood SES are more closely related. Thus, in model 2 the effect of the neighborhood's SES is capturing, to a large degree, the effect of school's SES.[93] As expected, a high level of residential segregation implies that schools serving different socioeconomic groups are sorted into neighborhoods with similar characteristics. This makes it difficult to distinguish between the effects of these two variables.

Table 5.5 shows that, as compared to the null model, the inclusion of the neighborhood's SES (model 1) explains 70% of the variability at level-3. In other words,

[92] The standardized coefficient of the school SES is the absolute average of the standardized coefficients of the 4 school SES dummies: -0.14, -0.48, -0.52, and -0.13 respectively.

[93] This is not strange since, as explained above, available data allows computing the effects of daytime segregation only, assuming that the characteristics—and thus the effects—of nighttime segregation do not radically differ. In doing so, and given the particular geography of opportunities, neighborhood SES is more likely to resemble the school's SES than it is to resemble the household's SES.

this variable alone is responsible for more than two thirds of the "neighborhood effects" on educational outcomes.[94]

The inclusion of the natural logarithm of the per capita income in the household (model 2) reduces the variability at level-1 from 1,977 to 1,963. What is interesting is that this household level variable also decreases the test scores' variances at levels 2 and 3. In fact, household income reduces the between-school and between-neighborhood variability by 21% and 26% respectively. This can be interpreted as further evidence of multicollinearity between levels expressed in school segregation and the selection bias in residential decisions (or, for that matter, constrained allocations of social housing for the poor). Both biases are somehow based on socioeconomic characteristics of the households, which explain the reduction of level-2 and level-3 variability due to the introduction of this household-level variable. Similarly, the inclusion of the school's SES dummies not only reduces level-2 variability by 34% but it also reduces level-3 variability by 50%. This can be interpreted as evidence of the disparity in the geography of opportunities in neighborhoods with different socioeconomic status.

[94] Strictly speaking, and as we will see in the next models, the effect of this variable is concealing the effect of other variables that are closely related to it, such as the neighborhood's unemployment rate and the spatial lag of the neighborhood's SES. Thus, this 70% of variance reduction is also due to the effect of these concealed variables.

Table 5.5 Education production function: income models. Random Effects

	Null Model		Model 1 Neighborhood SES		Model 2 Neighborhood, Household SES		Model 3 Neighborhood, Household, School SES	
Variance								
Level-1	1,976.9		1,976.9		1,962.9		1,961.2	
Level-2	515.4	***	516.9	***	406.8	***	270.1	***
Level-3	485.8	***	143.6	***	106.9	***	53.8	***
% Explained Variance								
Level-2			0%		21%		34%	
Level-3			70%		26%		50%	

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1

It is important to highlight that, after including the indicators of socioeconomic status at the household, school, and neighborhood levels, random effects remain significant. This means that, although socioeconomic statuses at the three levels of analysis are important predictors of math test scores, there are other characteristics of the school and the neighborhood that potentially explain these outcomes. In other words, there is some school heterogeneity and some spatial heterogeneity that can be explained by other school and neighborhood variables.

Model 4 in Table 5.6 describes the results of including the remaining individual and household explanatory variables in the estimation of math test scores. According to the likelihood ratio test (MLE), the inclusion of all variables at level-1 significantly improves the model (p-val<0.01).

There is a certain degree of multicollinearity within this level—in particular, between household income and years of education, that shows a correlation of 0.61 (p-val<0.01). Hence, the inclusion of the remaining six student and household covariates

causes the effect of household income to decrease from 8.10 in model 3 to 4.47 in model 4. Nonetheless, the effect of household income remains statistically significant while one additional average year of education among adults in the household significantly improves math test scores by 1.7 points.

Children who live with both parents show 2.52 additional points on the math test than those who live with one parent or neither parent. Children who have not failed a grade in the past have 21.64 more math points than those children who have ever failed a grade in the past. Attending pre-school does not translate into higher test scores in 4th grade. It is likely that the positive effects of pre-school education on educational outcomes disappear soon after children start primary education, since teachers tend to set standards in accordance with those children who have not attended pre-school. Nonetheless, since pre-school attendance is positively correlated with the socioeconomic variables introduced in level-1 (income and years of education), this variable will still be included in the following models, even if it is not significant.[95] One additional percent in the corrected odds in which parents expect children to reach at least some years of post-secondary education, increases educational outcomes by 13.59 points.[96]

[95] Simple t tests on the means show that both average years of education among adults in the household and average household income are higher among the families of children that have actually attended pre-school.

[96] Conclusions about the causal effects of parental expectations might raise suspicion due to the endogenous nature of the original variable. As explained above, parental expectations are estimated using instruments that are uncorrelated with the error term. The predicted value from this estimation is the variable that gets into the education production function in models 4, 5, and 6 in Table 5.6. However, since there is only a limited amount of instrumental variables, parental expectations in their adjusted form might still be endogenous to the dependent variable. In order to check how important this problem is, I compare the models with and without the variable of the adjusted parental expectations. Indeed, the results do not change substantially and the test that compares the coefficients with and without the adjusted parental expectations is not statistically significant. The inclusion of the variable generates only minor and not statistically significant changes in coefficients and standard errors—according to a suest test. This means that, even though we need to be cautious when establishing causality in the model, we can be confident that the inclusion of a potentially endogenous variable is not distorting the results of the coefficients.

Table 5.6 Education production function: Fixed Effects

	Model 4		Model 5		Model 6	
Intercept	230.37	***	227.19	***	230.60	***
Neighborhood's SES (ZSES)	1.61	***	2.05	***	1.24	ns
Spatial Lag Neighborhood's SES					0.42	ns
Unemployment Rate (HHUR)					-0.35	ns
Type of School						
Public			-1.96	ns	-2.04	ns
Private Subsidized			0.34	ns	0.45	ns
School's SES						
Low SES	-58.36	***	-48.18	***	-49.52	***
Mid-Low SES	-44.46	***	-37.37	***	-37.46	***
Mid SES	-29.55	***	-27.68	***	-27.73	***
Mid-High SES	-15.80	***	-17.93	***	-17.32	***
Teacher's Job satisfaction (TJS)						
Intercept			1.17	**	1.33	***
Hot Spot					-4.39	*
Cold Spot					-0.94	ns
Classroom climate (CC)			1.69	***	1.60	***
School-Family Bond (SFB)						
Intercept			3.99	***	4.23	***
Hot Spot					6.43	**
Cold Spot					-4.27	***
Teacher's Expectations (TE)			3.14	***	2.47	***
Household Income (LnINC)	4.47	***	4.39	***	4.60	***
Household years of education adults	1.70	***	1.69	***	1.71	***

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1

Table 5.6 (cont.) Education production function: Fixed Effects

	Model 4		Model 5		Model 6	
Live with both parents						
Intercept	2.52	***	2.45	***	2.40	***
Hot Spot					2.15	*
Cold Spot					-1.20	ns
Adjusted Parent's expectations	13.59	***	13.13	***	13.13	***
No grade failure	21.64	***	21.42	***	21.54	***
Male	6.98	***	7.04	***	7.17	***
Preschool	-0.11	ns	-0.14	ns	-0.14	ns
Deviance	*587,784*		*587,629*		*587,595*	
MLE	*44,058*	***	*154.8*	***	*43.65*	***
df	*7*		*6*		*8*	

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1

As in the previous model, standardized coefficients in model 4—not shown in the table—reveal that the effect of the neighborhood's SES on educational outcomes is less important than the effects of the school's and household's socioeconomic status.[97] Nonetheless, after controlling for all the individual variables in the model, the effects of the neighborhood socioeconomic status remain virtually unchanged and statistically significant.

Model 5 includes the remaining school-level covariates—other than the dummies that indicate the school's socioeconomic status. A significant likelihood ratio test (MLE) indicates that the inclusion of these variables significantly improves the model, even though some variables turn out to be statistically insignificant, such as the dummy variables that distinguish the three types of schools implemented after the educational

[97] From higher to lower, the ranking of the standardized coefficients are: School's SES (0.21), No grade failure (0.12), Adjusted Parental expectations (0.12), Household years of education among adults (0.10), Household Income (0.07), Male (0.06), Neighborhood's SES (0.03) and living with both parents (0.02).

reform during the 1980s. This result is not surprising given that the type of school—public, private subsidized, and private non-subsidized—and the school's SES are significantly correlated. As described in Chapter 4, public schools are indeed schools of low and medium-low status, whereas private non-subsidized schools are schools of medium-high and high socioeconomic status. Moreover, school segregation makes families sort themselves into schools of different types, according to their income level. Thus, it is likely that both covariates, household income and school's socioeconomic status, are concealing the differences in math test scores between types of schools. Thus, the variables will remain in the following model in spite their low t-ratio.

After including the remaining school-level variables in model 5, all level-1 variables included in the previous steps remain statistically significant and virtually unchanged. The effect of the neighborhood's socioeconomic status also remains significant, and—based on full standardized coefficients—the effect of this level-3 covariate is ranked 8th out of the 12 significant variables in the model. These standardized coefficients reveal that the ranking of the variables in the model remains almost equal to the ranking of the effects in the previous model.[98]

The indicator of the level of school-family bond—i.e. the share of parents that always or almost always attend school meetings—turns out to be an important element in the equation.[99] One additional standard unit in the percentage of families that always or almost always attend school meetings is associated with almost 4 additional math test points in the school. Schools that are able to engage parents in the educational process of their children have better educational outcomes. This finding means that schools in which

[98] As before, the most important variable in this education production function is the school SES with a standardized absolute average coefficient of 0.19.
[99] Based on fully standardized coefficients -0.07 for this variable—school family bond ranks 5th out of twelve significant variables in the model.

a large number of parents are actively involved in the school's activities are more effective than the rest.

Teacher's expectations and teacher's job satisfaction are both positively and significantly correlated with math test scores. Classrooms where teachers think children will reach at least some years of post-secondary education have 3.14 additional points on math test scores. Where everything else is constant, one additional standard deviation on the index of teacher's job satisfaction is associated with 3.17 additional points on the math test. Similarly, a better learning climate in the classroom is associated with 1.69 additional math test points. Although significant, these variables are less important than the rest of the school-level variables. Full standardized coefficients rank these three variables as the least important of the 12 significant variables, together with the level-1 variable "living with both parents". Standardized coefficients for these four variables are around 0.02, which means that one additional standard deviation in each of these school-level covariates is associated with 0.02 additional standard deviations in the math test scores—approximately one additional point.

Model 6 includes the remaining neighborhood variables other than the neighborhood's socioeconomic status that is being included from model 1 onwards. As explained above, the model tests for the direct effect of the unemployment rate in the neighborhood, and the indirect effect of concentration of poverty on educational outcomes. Model 6 in Table 5.6 indicates that one additional point of unemployment rate among heads of households in the neighborhood is associated with 0.35 fewer points of math test scores. A high unemployment rate indicates the existence of few role models that help children to visualize their own success in the future and to connect current educational outcomes with life chances later in life. Although this covariate shows the expected direction, the effect of this proxy of the availability of role models in the

neighborhood is not statistically significant. This is likely due to the fact that unemployment is negatively and significantly correlated with the neighborhood's socioeconomic status.[100] Indeed, the effect of the latter remains statistically significant at the 5% confidence level. Due to this multicollinearity, the effect of the neighborhood's unemployment rate on educational outcomes cannot be distinguished from the effect of the neighborhood's socioeconomic status on educational outcomes.

Something similar occurs with the estimation of the spatial externalities. The introduction of the socioeconomic status in adjacent neighborhoods—or the spatial lag of the neighborhood's SES—in model 6, is aimed at testing the direction and significance of the effect of socioeconomic status in the distal context—i.e. in adjacent neighborhoods. For spatial externalities to exist, the spatial lag of the socioeconomic status at the neighborhood level should show a significant effect, above and beyond the effect of the neighborhood's SES. Although socioeconomic status in the adjacent neighborhoods shows a positive effect on math test scores, this effect is not statistically significant. This is due to the high and significant correlation between socioeconomic status in the neighborhood and socioeconomic status in the neighborhood's neighbors. In other words, socioeconomic residential segregation itself complicates the estimation of spatial externalities in a multilevel model. The spatial models presented in the next section provide a better estimation of these types of effects.

The way in which spatial concentration of poverty and spatial concentration of wealth affect educational outcomes is by means of interference with the effect of other variables in the model. As suggested above, the model finds that there are significant indirect effects of concentration of poverty and of concentration of wealth on educational outcomes.

[100] Pearson's pair wise correlation between the neighborhood unemployment rate and the neighborhood's SES is -0.81 with a p-value of 0.000.

While model 5 presents evidence for a positive relationship between teacher's job satisfaction and math test scores, model 6 suggests that this relationship is different in mixed areas than in segregated areas. In the former, one additional standard deviation of teacher's job satisfaction is significantly related to 1.33 additional points on the math test. However, in neighborhoods where poverty concentrates, teacher's job satisfaction is not positively correlated with educational outcomes; on the contrary, further satisfaction among teachers is associated with slightly lower test scores. Indeed, one additional standard deviation of teacher's job satisfaction in schools located in neighborhoods where poverty concentrates is significantly related to 3.05 fewer points on the math test.[101] This result means that, in schools located in poor and segregated areas, satisfied teachers are associated with children who do relatively worse on the math test.

One possible explanation for this puzzle is that—as will be described in the next chapter—in areas that are socially vulnerable, teachers who are satisfied with their jobs see more reward in the socialization of their students as opposed to their cognitive development. In other words, teachers in poor and segregated areas might be more concerned with the "moral" than with the "instrumental" goals of education (Luhmman, 1996). Thus, satisfaction is more correlated with success at providing children with the necessary tools that will allow them to navigate in the world. In areas that are socially deprived, the teacher's satisfaction is less related to the thought that children are cognitively evolving than it is related to the belief that the school—and the teacher himself—consists of a "safety net", without which children would not survive in mainstream society.

In areas where wealth concentrates, the effect of teacher satisfaction on educational outcomes remains positive and statistically significant, although it is not

[101] This effect is obtained simply by adding coefficients φ_{080} and φ_{081} (see equations above) which are 1.33 and -4.39 respectively.

different from the effect of this covariate in mixed areas. These results suggest that spatial concentration of poverty affects educational outcomes, since teacher satisfaction is formed around parameters that are different from those associated with the instrumental end of education. In this sense, teacher job satisfaction in schools located in poor and isolated neighborhoods does not correspond with better educational outcomes.

The second indirect effect of concentration of poverty and concentration of wealth on educational outcomes works through the effect of the school-family bond, an indicator of the degree to which the school and the family work cooperatively for the children's education. According to model 6 in Table 5.6, in mixed areas one additional standard deviation in the percentage of parents that always or almost always attend school meetings is associated with 4.23 additional points on the math test. In areas of concentrated poverty, schools that successfully engage parents in the educational process of their children score 10.66 additional points. Finally, the positive effect of the school-family bond virtually disappears in areas of concentrated wealth. It is possible to argue—following Bourdieu's (1977) argument that formal schooling mimics the cultural ethos of middle and higher social classes—that it is likely that the school-family bond is relatively more beneficial for parents who live in places where poverty concentrates. These parents have fewer opportunities to be exposed to the behaviors and attitudes that are expected in the classroom. Since the understanding of these behaviors and attitudes is extremely relevant to supporting the schooling process, school meetings are a valuable opportunity to obtain a better understanding what is expected from children in the context of formal schooling. Parents who understand the nature of these behaviors and attitudes can engage in more cooperative work with the school which is extremely relevant in areas of concentrated poverty, where behaviors and attitudes in the neighborhood are often the exact opposite from those expected in the classroom.

This is an extremely relevant finding. On the one hand, the evidence that the school-family bond is more than twice as effective in areas of concentrated poverty than in the rest of the city is an indication of spatial heterogeneity. The significance of this coefficient demonstrates that the input of the school-family bond is more effective in some neighborhoods than in others, while the differential in effectiveness is explained by a neighborhood characteristic, namely, spatial concentration of poverty. On the other hand, this finding sheds a very positive light in terms of policy implications. Even if desegregation itself is difficult and requires a long time span in order to be accomplished, its negative effects can be countered by fostering a strong bond between the institution and the family.

Table 5.7 Education production function: complete models. Random Effects

	Model 4		**Model 5**		**Model 6**	
Level 1 Variance	1,886.4		1,885.9		1,886.3	
Level 2 Variance						
Intercept	202.6	***	184.2	***	179.3	***
Household Income	3.0	**	4.1	**	2.5	**
Level 3 Variance						
Intercept	42.9	***	36.2	***	34.1	***
% Explained Variance Level-2	36.5%		8.4%		3.4%	
% Explained Variance Level-3	20.3%		15.6%		5.7%	

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1

Model 6 provides further evidence of a third indirect effect of concentration of poverty on educational outcomes. According to this model, living with both parents has a positive effect on educational outcomes. This positive effect almost doubles in areas of concentrated poverty, as compared to mixed areas and to areas of concentrated wealth. Although the data does not allow controlling for the quality of adult supervision provided by both parents, as opposed to the quality of adult supervision provided in families with

absent parents, it is possible to argue that two-parent families are more effective in these terms and can offset the lack of collective efficacy in areas of concentrated poverty. Thus, this result can be interpreted as an indicator of the relative importance of close adult supervision in areas of concentrated poverty.

Table 5.7 shows the magnitude and significance of the random effects in models 4, 5, and 6. The table also provides the percentage of variance that is explained after including the variables in each one of the consecutive models. As described above, model 4 includes all student and household covariates besides the socioeconomic statuses of the household, the school, and the neighborhood. Model 4 also introduces the hypothesis that the effect of household income on math test scores randomly varies between schools. The variance of this coefficient turns out to be small but statistically significant, which means that there is a degree of school heterogeneity in the sensitivity of educational outcomes to household income. This variability could be explained by other characteristics of the school that have not been introduced in the analysis. The introduction of observed characteristics of the school in model 5 and of neighborhood characteristics in model 6 does reduce the observed between-school variance of 8.4% and 3.4% respectively. However, the models do not explain which school characteristics explain the differences among schools in the effects that household income has on educational outcomes. In fact, this co-variance remains roughly constant and statistically significant until model 6.

The introduction of student and household covariates decreases individual level variance by 3.8%—from 1,961 to 1,886. It is worth noting that even though the reduction of variance at level-1 is rather low, student and household characteristics explain a noticeable amount of variance at levels 2 and 3 (36.5% and 20.3% respectively). As it has been suggested throughout this chapter, this is an indication of the fact that, on the one hand, schools tend to gather families from similar backgrounds and characteristics. This

type of selection bias is certainly to be expected, given the school-choice educational system implemented after the educational reform during the 80's. On the other hand, the fact that the introduction of student and household covariates reduces the model's variance at the neighborhood level indicates that families of certain characteristics self select or are allocated in certain neighborhoods, but not others. This type of selection bias can be explained in part by the system of social housing that allocates poor families to large social housing projects, generating large clusters of people of similar characteristics. The main consequence of this problem of selection bias is that the measured effect of student and household variables may overshadow the neighborhood effects. However, it is demonstrated in this research that even after controlling for individual characteristics, assuming that they are correlated with neighborhood characteristics, contextual effects are indeed significant. The selection bias is probably affecting the magnitude of these effects, but not their direction, nor their significance.

Altogether, variance at level-3 has been reduced by 93% between the null and the final models, whereas variance at level-2 has decreased by 65%.[102] Level-1 covariates have helped to reduce variance at further levels. Interestingly, level-1 variance decreases only by 4.6% after the introduction of student and household covariates. This means that these models are leaving out some covariates that are able to explain within school variability. For instance—due to lack of reliable information—the student's intellectual capacity or IQ has not been introduced into the models. There is some ground to justification for believing that intellectual capacity is randomly distributed across all social groups (Hollingworth, 1942); thus, even though IQ might explain a big portion of math test scores—and thus might significantly reduce variability at this level—we can

[102] The fact that level-2 and level-3 variances in model 6 are still statistically significant means that there are other school and neighborhood characteristics affecting test scores. These factors can be either observed or latent.

argue that this covariate is not very strongly correlated with other variables in the model, such as household income.

Model 6 includes the spatial lag of the neighborhood's socioeconomic status as a level-3 covariate. In this sense, this model is an approximation of a spatial hierarchical cross-regressive model that arguably measures spatial processes, spatial heterogeneity, and spatial dependence at the same time. However, there are several reasons why this is not a perfect way of measuring spatial externalities—i.e. spatial dependence. Firstly, multilevel models do not allow for estimating spatial lag or spatial error models which can be a better way to measure spatial externalities. Secondly, even if spatial externalities are totally explained by the territorial socioeconomic status of adjacent neighborhoods—and they can be measured through spatial cross regressive models—there are some reasons why these models are not the best way to measure spatial dependence in education. On the one hand, the strong correlation between the neighborhood's socioeconomic status and its spatial lag make it difficult to disentangle the effects from these two elements. On the other hand, it was mentioned that the model holds an important variance at the student and household level, that is not explained by the variables introduced in the model. This random variation within the school may be concealing the spatial dependence between neighborhoods.

Possibly, spatial models that consider the neighborhood as the unit of analysis—rather than the students—may be a better way of measuring spatial dependence. As explained in the first part of this chapter, spatial models test for spatial dependence, using an adjusted average math test score in the neighborhood. Multilevel models are used to construct an average neighborhood test score, net of the confounding effects of lower levels of analysis.

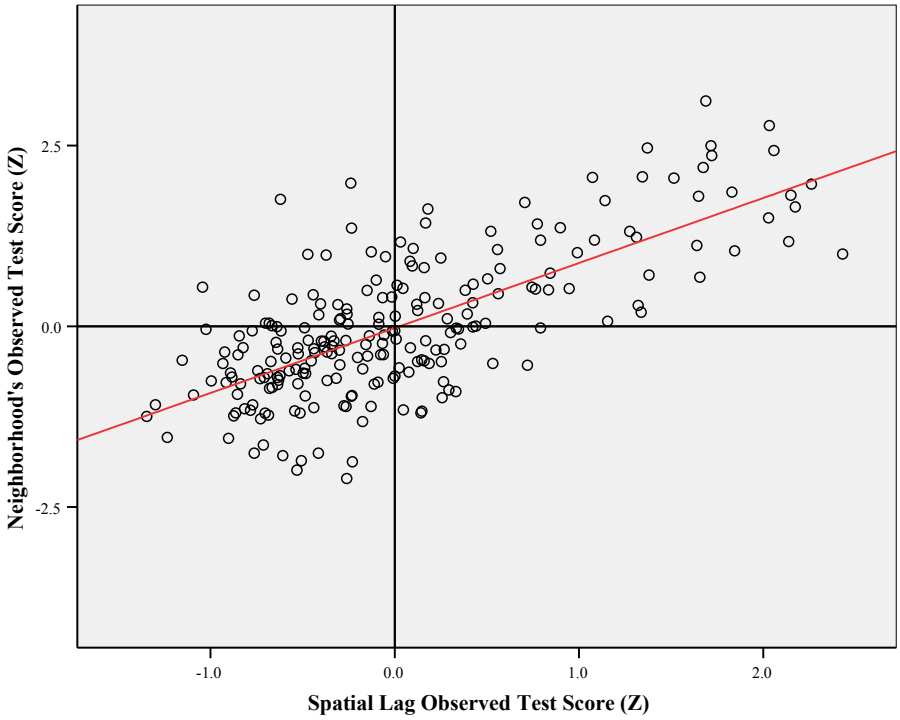
5.2 SPATIAL DEPENDENCE

Spatial dependence refers to the idea that "everything is related to everything else but near things are more related than distant things" (Tobler, 1970 p.234) which means that educational outcomes in one place depend upon educational outcomes in places nearby. The underlying assumption is that spatial proximity—and the interaction between spatial units—generates a spatial process by which elements in close proximity affect one another.

The Moran scatter-plot in figure 5.7 shows the relationship between standardized observed test scores in the target neighborhood and the observed test scores in its adjacent neighbors, or its spatial lag.[103] The slope of this relationship in this scatter plot is the Moran's I, which in this case is 0.57 (p-value <0.001), indicating a significant and fairly high correlation between average math test scores and average math test scores in the adjacent neighborhoods. In itself, Moran's I is a good indication of spatial dependence in math test scores. A more visual indication of spatial dependence is provided by the spatial clustering of educational outcomes in neighborhoods within the city. Map 5.2 shows the spatial clustering of observed math test scores in the neighborhood measured by Local Moran's I. Blue areas are those where high test scores are spatially correlated with high test scores in the surrounding areas. Red areas are neighborhoods that show low test scores and that are significantly surrounded by other neighborhoods with low math achievement.

[103] In this research, spatial dependence is tested using a first order contiguity matrix. The assumption is that spatial externalities and/or spatial diffusion occur between contiguous neighborhoods.

Figure 5.7: Moran Scatter Plot: Observed Math test Scores across districts in Santiago

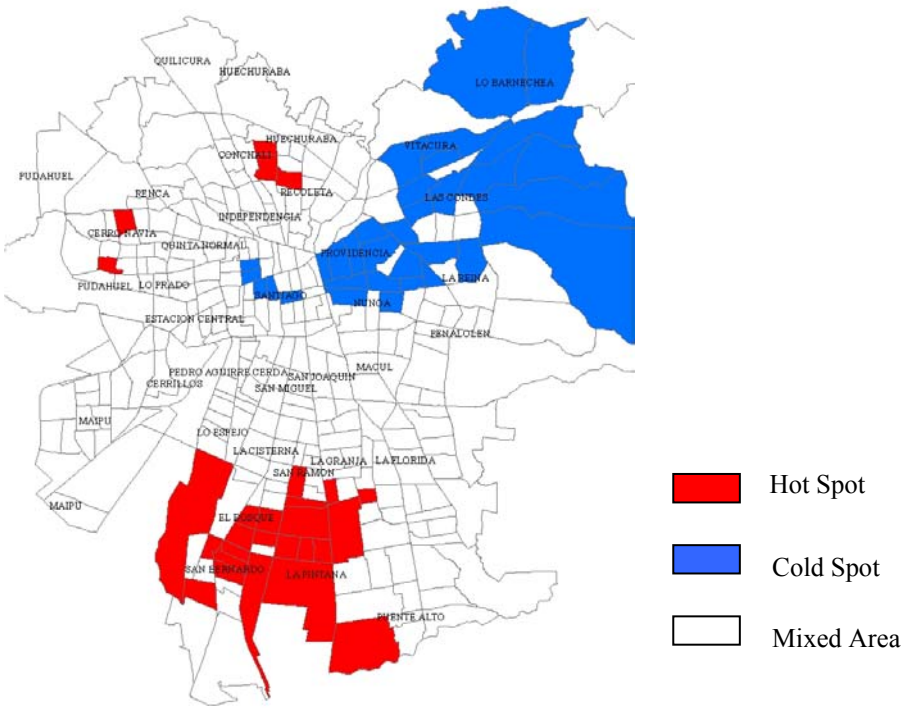


Note: Moran's I = 0.57 (p-val<0.001)

Global Moran's I in figure 5.7 suggests that there is a general degree of spatial dependence in math test scores, which is manifested in the blue and red neighborhoods on map 5.2. However, there are several reasons why educational outcomes turn out to be so strongly clustered in space. Spatial clustering can be a result of the fact that all or some of the covariates at any level are also spatially correlated. For instance, think of two adjacent neighborhoods that have low test scores because both of them have low socioeconomic status, which is actually the case in this model (see the similarities between maps 5.1 and 5.2). In this case, controlling for the neighborhood's SES should

account for the spatial clustering of test scores. Alternatively, if spatial clustering of math test scores still exists after controlling for the neighborhood's characteristics, then there is evidence of a true spatial process. In this case, low test scores in a neighborhood will be partly a consequence of the characteristics of adjacent neighborhoods, even if the characteristics of the target neighborhood alone do not predict low tests scores.

Map 5.2: Local Moran's I: Observed Math Test Scores across districts in Santiago



Spatial dependence indicates that test scores in one place are related to test scores in nearby places. This spatial process can take two forms: diffusion or externalities. While the former describes an intrinsic process by which an outcome spreads to other places—such as the case of a contagious disease—the latter refers to a more complex

social process that spills over to adjacent areas, generating similar outcomes. In methodological terms, a diffusion process would require a spatial lag model where outcomes are a function of their spatial lag. Spatial externalities are more likely to be measured by means of a spatial error model—where the social process that spills over is latent, unobservable, or even random—or by means of a spatial cross-regressive model—where we have an idea of what observed factors are spilling over and thus are causing these spatial externalities.

Column one in Table 5.8 shows the results of a simple OLS regression in which the dependent variable is the adjusted neighborhood's math test score.[104] This dependent variable is computed in a two-step procedure that can be understood as an approximation of a spatial hierarchical model, more general than the hierarchical spatial cross-regressive model presented in model 6 in the previous section. In the first step, a neighborhood level measure of the dependent variable is calculated, using coefficients from a multilevel model that does not include any covariate at level 3. In order to obtain the "within-neighborhood" effect of the covariates, variables at level-1 and at level-2 have been introduced for deviations to the group means. Then, a predicted math test score is computed for each student and aggregated at the neighborhood level.

Finally, the construct that is used to estimate spatial dependence takes the following form: $y^* = y_k - \bar{y} - \left[\sum \beta_{ws}\left[x_{ijk} - \bar{x}_{jk}\right] + \sum \beta_{wn}\left[z_{jk} - \bar{z}_k\right]\right]$, where $y_k - \bar{y}$ is the deviation of the observed average neighborhood's test score to the grand mean and the rest of the equation is the estimated individual test score aggregated to the neighborhood level (see Morenoff, 2003 p. 993). Thus, the adjusted score used to test for spatial dependence is "clean" of the individual, household and school's effects and contains the

[104] All the statistical outputs from the models presented in this section can be found in appendix 4.

multi-level residuals and the component that is likely to be explained by the neighborhood characteristics.[105]

Table 5.8: Spatial dependence as spatial diffusion.

	OLS		Spatial Lag (ML)		Spatial Lag (ML: robust)	
Constant	12.174	**	10.5	***	9.832	*
Unemployment Rate	-1.182	**	-1.066	*	-1.001	*
Neighborhood's SES (z scores)	15.495	***	10.508	*	11.331	***
Rho			0.36	***	0.32	***
R^2	60.8%					
MLE			16.834	***		
Jarque Bera	3.635	ns				
White	9.895	*	5.192	*		
Test for Spatial Autocorrelation						
Lagrange						
Spatial Error (robust)	0.365	ns				
Spatial Lag (robust)	7.781	***				

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1
(a) Dependent variable is the adjusted neighborhood's test score

Two variables have been included in this OLS regression: the unemployment rate among heads of households and the standardized neighborhood's socioeconomic status. Both variables behave as expected: while the unemployment rate negatively affects the adjusted math test scores in the neighborhood, the socioeconomic status positively affects this outcome. The regression shows an adjusted R^2 of 60.8% while the error term is

[105] Despite the fact that this model includes all individual/ household covariates, 73% of the total unexplained variance corresponds to individual/ household characteristics not included in the model. As mentioned above, it is very likely that a big portion of this variance is explained by genetics or the student's intellectual capacity. Since this attribute is randomly distributed across all social groups we can expect that the exclusion of this variable does not have catastrophic consequences for the results. In addition, 10% of the model's variance is explained by unobserved characteristics of the classrooms, whereas the remaining 16.7% is explained by the neighborhood's characteristics.

normally distributed. However, at least two problems appear in this regression: on the one hand the White test suggests that the error term is heteroskedastic. On the other hand, the Lagrange robust test confirms that the error term is spatially auto-correlated. Besides, since the Lagrange test is significant in its spatial lag form, the test suggests that the form of this autocorrelation is somewhat related to the variables included in the model. In other words, spatial clustering of the math scores is not exclusively explained by the spatial clustering of the neighborhood's socioeconomic status; instead, the data suggests that there is a true spatial process in the data.

The second column in Table 5.8 tests the hypothesis of spatial diffusion. Somewhat naively, model 2 tests for the hypothesis that math test scores intrinsically spread from one place to another as a contagious disease would do. Since the spatial lag of the dependent variable is endogenous, we need to switch to Maximum Likelihood estimation. As stated in equation (7) in Chapter 3, the spatial diffusion hypothesis takes the following functional form: $Y = \rho Wy + XB + \varepsilon$, where the coefficient ρ indicates the rate at which diffusion occurs. In other words, coefficient ρ is the change in the target neighborhood's adjusted test score associated with a one unit change in the test scores of adjacent neighborhoods.[106]

In the model, the coefficient is statistically significant and reaches 0.36, which means that—after controlling for individual, household, and school effects—the total observed and unobserved effects in adjacent neighborhoods account for more than a third of the variance in test scores in the target neighborhood. In other words, total effects of math test scores are 36% larger when the observed and unobserved effects of math test scores in surrounding areas are accounted for. Moreover, the effects of the unemployment rate and the neighborhood's SES remain statistically significant. Since the

[106] This coefficient is a spatial multiplier; thus, it is constrained between 0 and 1.

White tests confirms heteroskedastic errors, it is necessary to reassess the model using robust standard errors.[107] Column 3 in Table 5.8 shows these results, which do not change very much as compared to the non-robust results.

The "rho" coefficient in a spatial lag model combines spatial effects from all the explanatory variables in the model with the effects from the random unobserved factors in the error term. Thus, instead of thinking that math test scores intrinsically spread from one neighborhood to another, we can test an alternative hypothesis: externalities in education are mainly driven by residential segregation itself. In other words, spatial dependence in education is more likely to be a social process by which math scores spill over in space rather than a diffusion process that involves all observed and unobserved effects in the surroundings.

Table 5.9: Spatial dependence as spatial externalities.

	Model 1		**Model 2**	
Constant	12.174	**	13.153	**
Unemployment Rate	-1.182	**	-1.278	**
Neighborhood's SES (z scores)	15.495	***	10.647	***
Spatial Lag: Neighborhood's SES			6.122	***
R2	60.8%		62.0%	
Jarque Bera	3.635	ns	4.164	ns
White	9.895	*	8.411	ns
Test for Spatial Autocorrelation				
Lagrange				
Spatial Error (robust)	0.365	ns	0.142	ns
Spatial Lag (robust)	7.781	***	0.173	ns

Note: *** p-val< 0.001; ** p-val <0.05; * p-val <=0.1; ns: p-val> 0.1
Dependent variable is the adjusted neighborhood's test score

[107] Robust models are run in stsls in R.

Table 5.9 shows that, as it was shown in Table 5.8, when including the unemployment rate and the neighborhood's SES only, there is evidence of spatial autocorrelation. Nonetheless, when we include the spatial lag of the neighborhood's SES as an additional explanatory variable in model 2, this spatial autocorrelation disappears (Lagrange test is no longer significant). Since the spatial lag of the neighborhood's SES is not an endogenous variable, we can rely on this simple OLS result. One problem that this regression might present is that the neighborhood's SES and its spatial lag are highly correlated (Moran's I is 0.73 and statistically significant). However, in spite of this multicollinearity, both covariates are statistically significant and positively affect educational outcomes.

What is interesting about model 2 in Table 5.9 is that it allows us having a better grasp of the spatial process in education. While in the spatial lag model in Table 5.8 we could only conclude that accounting for all the covariates in adjacent neighborhoods was important in calculating the neighborhood's average educational outcome, this spatial cross-regressive model suggests that what is driving spatial externalities is socioeconomic status in particular. In other words, accounting for the effect of socioeconomic status in adjacent neighborhoods totally explains the spatial process and suppresses the spatial autocorrelation in the error term. In simple words, we can argue that spatial dependence of educational outcomes is totally explained by the effects of residential segregation, or the fact that there are certain social processes associated with the spatial concentration of poverty and wealth that make educational outcomes spill over across neighborhoods. The next chapter is aimed at understanding these social processes.

5.3 MAIN FINDINGS FROM QUANTITATIVE ANALYSIS

In this chapter I explore and measure the magnitude of two spatial processes that are likely to appear in any spatial data. These processes -spatial heterogeneity and spatial dependence—are tested by means of multilevel and spatial models implemented in a two step procedure, as suggested by Morenoff (2003).

In the first step, three-level models are used to compute an adjusted average test in the neighborhood that is "clean" of the confounding effects of student, household, and school characteristics. In addition, this type of estimation is also used to test for spatial heterogeneity and for spatial externalities in education. In a second stage, the adjusted average test scores in the neighborhood are used to test for the hypothesis of spatial dependence in all its forms.

From the multilevel models, we obtain several interesting conclusions regarding the neighborhood effects and the effects of concentration of poverty on educational outcomes. Firstly, a simple multilevel model without covariates at any level suggests that as much as 16.3% of the variance in the student's math test scores can be explained by characteristics of the neighborhood in which the school is located. This is a general estimation of the "neighborhood effect", from which the following models distinguish the part that corresponds to the effect of concentration of poverty in particular.

Secondly, the models provide evidence that there is a certain amount of multicollinearity driven by three selection biases. First of all, household preferences and even public policies—such as the construction of clusters of social housing in the peripheries of the city—make families from similar characteristics sort themselves in certain neighborhoods and not others. Due to this self-selection bias there is an important collinearity between the socioeconomic status of the household and the socioeconomic status of the neighborhood. This collinearity implies that the inclusion of household

variables explains between neighborhood variance, which means that household variables capture part of the neighborhood effects on educational outcomes. Secondly, an uneven geography of opportunities or spatial mismatch in education means that it is very likely that schools with a high amount of resources will be built in neighborhoods with high socioeconomic status. Similarly, poor schools will more likely be located in poor neighborhoods. This means that there is a high amount of collinearity between school and neighborhood characteristics. In turn, this collinearity creates a situation where the introduction of school variables in the model actually makes variance at level-3 decrease. Finally, a school-choice educational system implies that families have freedom to choose the school of their preference, which also generates an amount of selection bias. This bias is observed as collinearity between school and household variables, which means that including level-1 variables in the model also reduces variance at level-2. In other words, both household and school variables are possibly capturing the neighborhood effects. Thus, our estimates of the effects of the neighborhood characteristics can be considered lower bound estimates.

A third important finding of the models is that after controlling for individual and school characteristics, and despite the multicollinearity between levels of analysis, there are several measurable neighborhood effects. A hierarchical spatial cross-regressive model (see model 6 in Table 5.6) shows that even though spatial externalities are not distinguishable—probably due to the level and scale of socioeconomic segregation that makes socioeconomic status in a neighborhood highly correlated with its spatial lag—there are three indirect effects of poverty and wealth concentration on math test scores. First of all, the model suggests that living with both parents is more effective for educational outcomes in poor segregated areas than in mixed or wealthy areas. Secondly, model 6 finds that while teacher's job satisfaction predicts higher test scores, this positive

effect reverses in poor and segregated neighborhoods. This result relates to the idea that due to the urgency for fulfilling children's' basic needs, motivated and satisfied teachers in deprived areas are the ones that see themselves as social workers rather than providers of measurable knowledge. In contrast, in mixed and affluent areas, teacher satisfaction actually leads to better results since teacher duties are appreciated by their instrumental objective (Luhmann. 1996).

The third indirect effect of the concentration of poverty on math test scores relates to the evidence that engaging parents in the schooling process of their children is highly effective, and it is more so in poor and segregated areas. Thus, schools that engage parents in school meetings show better educational outcomes and this positive effect more than doubles in segregated areas. Given that the schooling process mimics the values of the middle and upper classes (Bourdieu, 1977) and that parents in segregated areas are largely isolated from this cultural ethos, school meetings are a true source of learning that can translate into higher test scores for these children in poor and segregated areas. Thus, the school-family bond is relatively more beneficial in poor segregated areas than in mixed and affluent areas.

Spatial models provide strong evidence of a spatial externality in education. At first sight, the models suggest a diffusion process by which math test scores intrinsically spread from one neighborhood to the next. However, a closer look at the data provides evidence that spatial dependence is completely explained by the effect of socioeconomic status in the surroundings. In other words, socioeconomic status in the distal context—the adjacent neighborhoods—also plays a part in determining test scores. This is nothing more than a spatial externality caused by concentration of poverty or concentration of wealth in the distal context.

The literature suggests that spatial heterogeneity and spatial externalities work through socialization mechanisms associated with the objective and subjective geography of opportunities. These mechanisms are further explored in the qualitative analysis in Chapter 6.

Chapter 6: Case Studies

Throughout this research it has been argued that concentrated poverty is directly related to the neighborhood's "geography of opportunities". Poor children living in low-income and isolated neighborhoods are more likely to attend schools that are not effective in helping them meet their developmental needs, which explains their low educational outcomes. Sociological theories of neighborhood effects suggest that socioeconomic segregation not only affects the quantity and quality of available opportunities in the neighborhood; but spatial concentration of poverty also shapes attitudes and behaviors, which translate into a particular kind of socialization for children that is often unfavorable for educational outcomes. In Galster and Killen's words (1995), socioeconomic segregation has an effect on the "subjective" geography of opportunities in at least two ways. On the one hand, social isolation makes information asymmetric, which means that parents in these types of settings do not have enough information in order to re-assess school quality and to consider changing schools. On the other hand, socioeconomic isolation affects the way in which people evaluate these opportunities as relevant and coherent to their "life plan". In fact, as it is described in this chapter, the situation of poverty and isolation at the local level affects coping strategies, expectations, and parents' decision-making regarding schooling.

The act of documenting a negative relationship between neighborhood poverty and school achievement does not establish why, ceteris paribus, children who live in deprived areas show lower test scores. Theoretically, the reason behind the relationship between concentrated poverty and educational results refers to the prevalence of a number of behaviors that mold children's learning process. However, when observed behavior means different things in different contexts, it is difficult to find a measurable

proxy that has one universal meaning. In this case, behavior requires interpretation. Moreover, this "ceteris paribus" mentioned above is rather an imaginary concept. In fact, school and residential segregation mean that social mediators that catalyze neighborhood effects (Connell, 1995) are more likely to show certain characteristics in some contexts, while not in others. As mentioned in the previous chapter, selection biases—driven by school and residential segregation and by an uneven geography of opportunities—cause make it difficult for researchers to distinguish the effects of these socialization mechanisms from the effect of the overall context.

These methodological setbacks call attention to the need for a deeper qualitative analysis of particular cases, which is incorporated into this chapter. Qualitative analysis provides a better understanding of the particular socialization mechanisms brought on by social mediators (parents, other adults in the neighborhood, teachers, and peers) in areas of concentrated poverty.

The strategy of analysis in this chapter is one of a collective case study that analyzes six educational communities, two in each of three low-income neighborhoods showing different levels of segregation. A collective case study is defined as the study of more than one case with the aim of understanding certain phenomena (Stake, 2003 p.138). In a collective case study, the cases are of instrumental interest: the researcher is not interested in the case itself, but in the belief that understanding the cases brings about a better understanding of the problem. In other words, what makes the analysis of these educational communities interesting is the fact that they are located in poor but more or less segregated areas. The neighborhood's level of socioeconomic isolation, in combination with the characteristics of the members of the educational communities within the neighborhood, are the ingredients for a number of kinds of socialization that ultimately have an effect on children's educational outcomes.

By means of semi-structured interviews, this research tries to understand the different behaviors and motivations by which social mediators socialize children in the neighborhood. In each of the six educational communities, four mothers, one teacher and the principal were interviewed. Mothers—as opposed to fathers—are more likely to be closer to their children on a daily basis, which means that they have a more complete knowledge of the daily events in the neighborhood and at school. Teachers and principals can inform us about the situation inside the classroom, the relationship between the school and the families, and the general approach of the school—its mission, its methods, etc. All interviews were tape recorded and were held in the school. In general, the conversations lasted between 60 and 90 minutes. [108]

Overall, the analysis is based on a total of 36 interviews: 24 mothers, 6 teachers and 6 principals. The selection of principals and teachers was rather straightforward. While there is one principal to select, fourth grade teachers were interviewed since this is the grade that corresponds to the testing used in the quantitative analysis. In contrast, mothers were selected through the teacher. This selection method is likely to introduce a bias, since the selected mothers are the ones that are closer to the teacher, and thus the ones that are more likely to be involved in their children's education. All of the mothers belong to the neighborhood where the school is located, while all of the teachers and principals live somewhere else. This is important since mothers can provide the perspective of the "insider" while teachers and principals provide a viewpoint as the "outsider".

In accordance with the theoretical framework presented in Chapter 2, the conversation with mothers, teachers, and principals revolved around three main topics: peer effects, collective socialization, and institutional socialization. Principals and

[108] Interview materials can be found in appendix 1.

teachers were asked specifically about the institutional socialization mechanism—the school-community bond and teachers' expectations. Mothers were asked about peer effects, role models, collective efficacy, and the school-family bond. In addition, all interviewees gave their impressions about the neighborhood conditions and their subjective experience in the neighborhoods in which they live or work.

Results are organized into four major topics that are logically connected to one another. The first topic refers to the subjective experience of residing or working in more or less segregated areas. Each one of the remaining three topics refers to the social and structural elements in the neighborhood and the way in which these elements shape attitudes and behaviors in the neighborhood. These elements are the available information, the role of expectations, and the normative structure of the community.

Since topics are presented in a logical way (i.e. one topic logically connects to the previous one), the way in which the main findings of the qualitative analysis are organized does not strictly follow the framework presented in Chapter 2. However, most elements from the unified theory of the effects of spatial concentration of poverty on educational outcomes are present in the narrative. The only element that cannot be addressed in this analysis corresponds to the effects of peers. Since the data collection method did not involve interviews of children, the topic was specifically treated through the mothers. However, the mothers are not quite able to provide a complete overview of the relationship between peers.

Before presenting the main findings from the interviews, this chapter provides a description of the neighborhoods and the educational communities analyzed in this collective case study.

6.1 CASE SELECTION

Three neighborhoods with different levels of segregation are the units of analysis in this qualitative research. Within each neighborhood I have chosen two educational communities formed by parents, teachers, and principals. Since these members of the educational community are considered in the literature (Connell, 1995) as the social mediators that catalyze the neighborhood effects, they are the units of observation in the analysis.

Three neighborhoods of similar socioeconomic status but with different levels of socioeconomic segregation were selected for the analysis. The neighborhoods' socioeconomic index ranges between 311 and 395 points, which corresponds to a medium-low socioeconomic status (see table 4.2 in Chapter 4). As compared to an average of 9.5% in the city of Santiago, the unemployment rate among heads of households is high in the three neighborhoods, and ranges between 12% and 17%. The share of adults with high school degrees or less is 28% in the total sample. In our neighborhoods, this share is between 41% and 60%.

As discussed in Chapter 3, residential segregation can be defined in several ways, depending on the aspects one wants to highlight. In this particular selection of cases, the main aspect of segregation to be accounted for is the dimension of clustering. One of the most efficient ways of measuring residential segregation in its dimension of clustering is by means of the family of the local indicators of spatial autocorrelation (Anselin, 1995). Using these indicators—particularly the Local Moran's I—segregated neighborhoods are defined as those located within a spatial cluster with a low socioeconomic status.[109] This

[109] For a description of the Local Moran's I, see Chapter 3.

way, the level of segregation in the neighborhood is assessed by comparing the size of the area forming a cluster of poverty. [110] .

6.1.1 The neighborhoods

The three selected neighborhoods are displayed in map 6.1 below. The first neighborhood, in the south of the city, is known as "El Castillo", located in the municipality of La Pintana. This "villa" presents a high level of spatial clustering. Besides being located on the edge of the largest cluster of poverty in the city, the majority of the blocks composing this neighborhood are also classified as hot spots.[111] The second neighborhood corresponds to "Valle de Azapa" in the municipalities of Cerro Navia and Renca on the north-west side. This neighborhood also presents high levels of poverty and socioeconomic segregation; however, as depicted in map 6.1, the size of the cluster is not as large as the size of the cluster in the south, which means that there is low-scale segregation. Finally, the third selected neighborhood corresponds to Peñalolén Alto in the municipality of Peñalolén, towards the east of the city. Although poor, this area cannot be considered to be socioeconomically segregated in terms of the dimension of clustering, at least at the level of census zones. In fact, the distal context—or adjacent neighborhoods—in this "barrio" is socioeconomically mixed.

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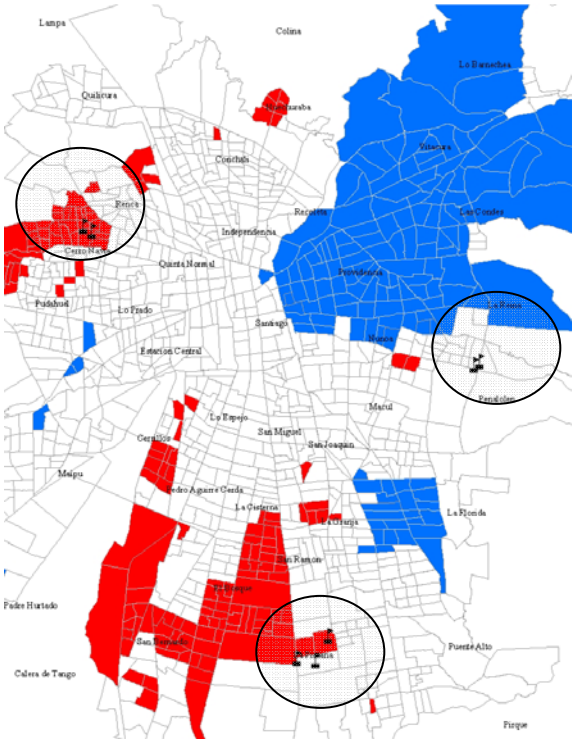
110 Two important decisions need to be made for the computation of the Local Moran's I. First, in order to estimate what and where the boundaries of a neighborhood are, a spatial unit needs to be chosen. In order to diminish measurement errors, I consider neighborhoods that mimic/coincide with the census zones. These spatial units are smaller than the census districts and provide a better sense of a community. Secondly, a spatial weight or neighborhood matrix defining the sphere of influence of the target neighborhood needs to be defined. The decision about a neighborhood matrix refers to the hypothesis about the nature of interaction between spatial units. Since there is little research of this kind to guide this decision, I simplify matters by restricting spatial autocorrelation to the first-order/immediate neighbors. This means that, for segregation to exist, socioeconomic status in second-order neighbors does not necessarily have to be directly correlated with the socioeconomic status in the target neighborhood. It suffices/It is sufficient if there is an indirect correlation through the first-order/adjacent neighbor.

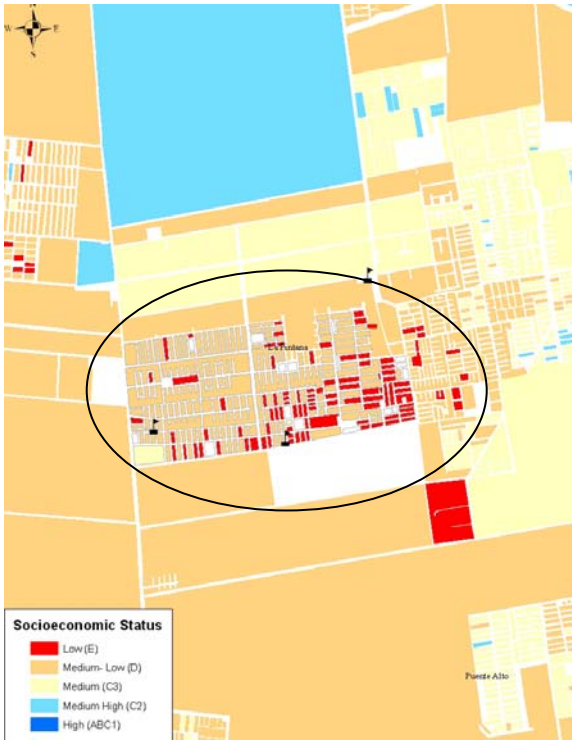
111 That is, when computing the Local Moran's I using the census block as the spatial unit of analysis, the majority of the blocks can be classified as hot spots.

Maps 6.2, 6.3, and 6.4 depict the socioeconomic variety across census blocks within and nearby each of the selected neighborhoods. Segregated "barrios" (El Castillo and Valle de Azapa) are, for the most part, composed of census blocks of medium-low socioeconomic status. Within both neighborhoods, a good number of these blocks can be classified as having a very low socioeconomic status (see census blocks in red). In both areas we can appreciate a socioeconomic homogeneity that reaches the distal context. However, while Valle de Azapa is close to a few middle class spots towards the east, El Castillo looks more isolated and homogeneous. Although map 6.2 shows that El Castillo is surrounded by large pieces of land of varying socioeconomic statuses, the experience in the field reveals that this is only an illusion of integration. In fact, the areas of medium socioeconomic status surrounding El Castillo—see yellow areas on map 6.2—correspond mainly to industries whereas the large blue area of medium-high socioeconomic status corresponds to one of the campuses of an important Chilean University. None of these areas have a considerable amount of residents. Thus, the "barrio" feels even more isolated since it is surrounded by non-residential areas.

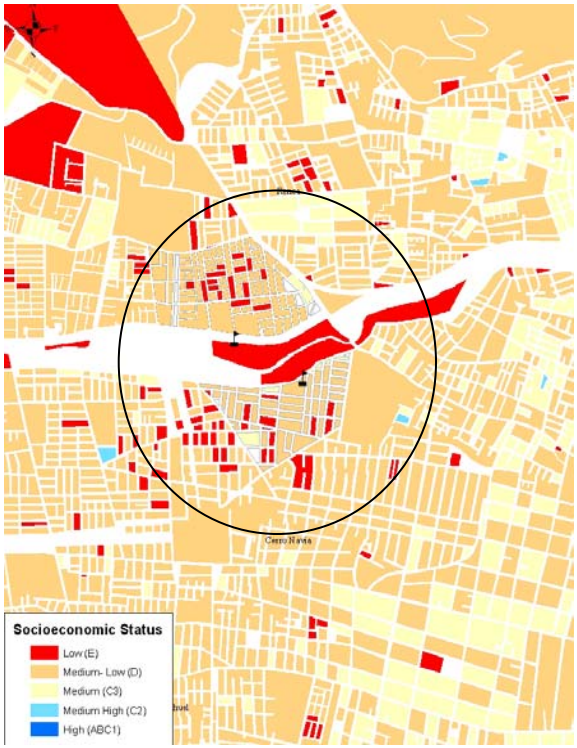
Map 6.1: spatial socioeconomic segregation: Local Moran's I.



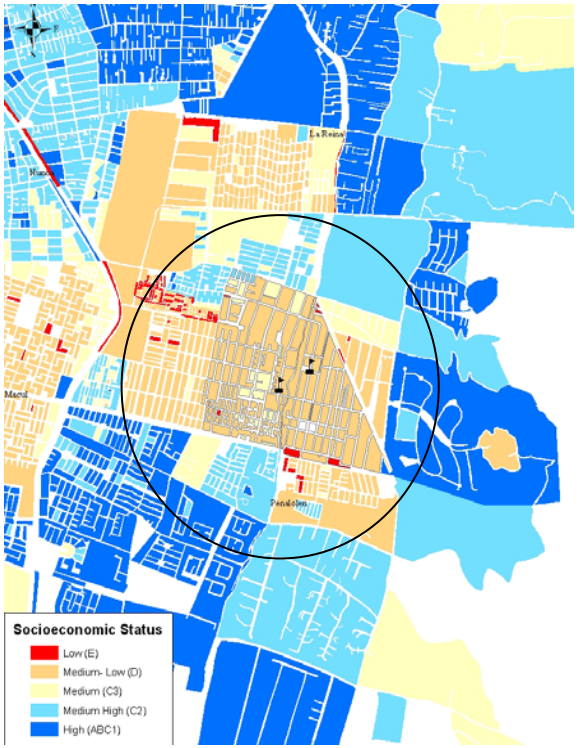
Map 6.2: Neighborhood #1: Villa el Castillo, Municipality of La Pintana



Map 6.3: Neighborhood #2: Villa Valle de Azapa, Municipalities of Renca and Cerro Navia



Map 6.4: Neighborhood #3: Peñalolén Alto, Municipality of Peñalolén



The main difference between the segregated neighborhoods, El Castillo and Valle de Azapa, is that the first thing to notice in the former is a sense of isolation, abandonment, and disorder. In contrast, the Valle de Azapa is a compact area that looks relatively well-connected to the rest of the city. In fact the new highway that connects the wealthy areas in the north-east with the airport passes right through the middle of the "villa" (see the wide white strip in map 6.3), which has brought more traffic to the area.[112]

Overall, Peñalolén Alto can also be classified as having medium-low socioeconomic status. Nonetheless, the distal geography—or adjacent neighborhoods—is radically different in these terms. Peñalolén Alto is surrounded by large areas with medium-high and high socioeconomic status (see light blue and blue areas on map 6.4). Socioeconomic heterogeneity in the distal context of Peñalolén Alto is more evident, considering that there is a red group of blocks towards the northeastern boundary of the neighborhood. This area corresponds to the "Toma de Peñalolén", an area that has been illegally occupied during the last decade, providing shelter to almost 1,900 families.

Summarizing, the segregated areas (El Castillo and Valle de Azapa) differ in that the former is more isolated from the rest of the city than the latter, which is a reflection of the different scales of segregation they represent. Nonetheless, in these two neighborhoods poverty is spatially concentrated, since areas of low and medium-low socioeconomic status are common in the distal context. In contrast, Peñalolén Alto is more similar to an island, surrounded by the middle and upper classes, and also by even poorer areas. This heterogeneity of socioeconomic conditions allows us to surmise that parents in the latter neighborhood are more exposed to different conditions, which can affect their behavior and the way their children are socialized.

[112] The big red areas in the highway correspond to a few homeless people that sleep beside the Mapocho River that runs next to the highway.

Neighborhoods also differ in terms of the experience in the field as a researcher. All three neighborhoods involved commuting of roughly one and a half hours via public transport. All three neighborhoods gave the impression of being very far away from the city center and the main commercial areas. The main difference is that while El Castillo felt dangerous and foreign, Valle de Azapa felt more "normal" and less threatening. Although I was warned about the dangerousness of the latter area, the neighborhood felt very much like a rural town. On this continuum, Peñalolén Alto, for the most part, felt safe and familiar. Actually, in this area, the "Cordillera de los Andes" mountain range imposes itself at a very short distance from the neighborhood, which is a very valuable amenity that makes the area very attractive for all kinds of investment. For instance, not far from the edge of the neighborhood is the main campus of one of the top Universities, which brings traffic to the area. Farther away there is a new development of social housing waiting to be assigned, and right across the road from that project there is an ecological community where intellectuals and artists live.

In the poor and segregated area, self-help houses are lined up in very narrow and crowded streets. There the street seems to be a natural extension of the household, which in fact generates the need for marking and defending one's territory. It is very noticeable that small children start at an early age to mimic the adults' manner of using the public space.

Noise is one of the factors contributing to these feelings of "abnormality" in the poor and segregated neighborhood. While the Chilean culture can be safely described as sober and restrained, the atmosphere in El Castillo includes a very noticeable degree of noise coming from loudly played stereos in each household. This "war of stereos" generates disputes between neighbors that build up over time. The principal of one of the schools located in the Villa El Castillo describes the neighborhood as follows:

"…on Saturday night the scene is awful. There is the "war of stereos" that lasts until late on Sunday. This war produces fights, yelling, and revenge between families. On Monday, students bring all that violence into the school. Mondays are terrible; parents come to school looking for the neighbor's child who hit their own child during the weekend. They want revenge (…)"[113]

Violence is one of the most noticeable problems in this very segregated neighborhood. In the non-segregated neighborhood, violence is also a potential threat although it is considerably less evident. According to the residents, the media is responsible for the sense of insecurity in the area. People hear that bad things happen all the time but in general they feel safe; they feel that trouble is somewhere else. Residents recognize the existence of drugs and alcoholism in the neighborhood, but when asked to name the main problems in the community, they refer to other problems associated with isolation and distance to jobs.

"I believe that the biggest problem in this neighborhood is that there aren't many industries and local sources of employment; thus, people have to commute long distances to find a job. Women usually work in domestic services; so children are left alone. In that sense these new middle-class gated communities have helped our people to find jobs nearby." [114]

Although it is difficult to know whether the sense of security is a product of security itself, according to this interviewee this particular community is also

113"(…) el sábado en la noche esto es espantoso. Tremendos aparatos de música compitiendo unos con otros, y esto se prolonga hasta el día domingo, así que se producen peleas, gritos, robos, asaltos eh (…) venganza de una familia con otra familia, y los alumnos llegan con todo eso el día lunes a esta escuela, y arrastran esa violencia para, hacia acá. Los días lunes son terribles acá po', porque llegan apoderados buscando al vecino, al hijo del tal por cual que le pegó a mi hijo, etcétera".

114 "Creo que (…) tal vez la gente, como Peñalolén no tiene empresas, trabaja muy lejos. Muchas mujeres nuestras trabajan como asesoras del hogar, incluso puertas adentro, que eso hace que los niños estén solos, solos, porque como trabajan muy hacia Las Condes o hacia otro lado entonces (…) pero cuando llegó estas villas nuevas cambió porque mucha gente en vez de ir a trabajar allá trabaja en este entorno, entonces también tienen eh (…) los jardineros que trabajan en la villa de acá, muchos jardineros (…)"

characterized by a stronger social capital and collective efficacy, which may be the reason for this increased feeling of security. For instance, one teacher says:

> *"The Police tell us that we are very vulnerable to attacks and robberies. Once one girl from the University was raped by a young man from nearby and the Police told us to be careful with him, because he was a very dangerous man. The man actually entered the school but he was not violent to us. He was nice to us. He didn't bother us. This is an open school, they could easily rob us if they want to, as the Police always say—but nothing has ever happened here. I feel that the community protects us. People call the cops when they see something strange. They know we do something good for them. Maybe they don't know exactly what, but they see the good things the school has done".* [115]

Thus, although drugs, alcohol, and violence are recognized as important problems by both residents and outsiders in all three neighborhoods, the problem is more evident in the segregated neighborhood than in the non-segregated neighborhood. Valle de Azapa—the neighborhood with a medium level of segregation—is in an intermediate situation. In this neighborhood, there is an area that is south from the highway that where the ambiance is very similar to the very segregated neighborhood. Another part of the neighborhood has a higher age average, and the settlements are older. This relative length of residence implies a more consolidated community and a lower dependency ratio, which may contribute to the sense of normalcy in this particular area.

115 "…los carabineros dicen que es una situación que aquí pudiendo pasar cosas muy grandes en cuanto a la delincuencia, que un niño, un joven que violó a una niña de la Adolfo Ibáñez, saltó acá y quiso entrar y (…) los carabineros me dijeron que era terrible, o sea, un tipo malo, malísimo. Y saltó al colegio (…) aquí no, no provocó gran cosa (…) fue hasta amable con nosotros, (…) es un colegio abierto, estas ventanas no tienen protecciones, que aquí podrían saquearnos, como nos ha dicho carabineros (…) la comunidad nos quiere, yo siento que nos quiere (…) porque es la escuela, por ejemplo hay gente que me ha dicho "señorita, yo vi cuando (…) pero inmediatamente que veo llamo a carabineros", entonces la gente realmente nos aprecia, sabe que nosotros estamos haciendo algo por ellos, a lo mejor no asumen qué pero (…) pero ven que el colegio algo ha hecho".

6.1.2 The Educational Communities

Two schools were selected within each neighborhood: one typical and one atypical.[116] Typical or instrumental cases are the schools that correspond to the main hypothesis of this research; these typical schools have low educational outcomes, whereas atypical cases are those that show higher than expected outcomes. Table 6.1 shows the main characteristics of each school.

Columns three and four in table 6.1 reveal one of the main shortcomings for the selection of schools. As has been documented in this research, math test scores are significantly different between public and private schools. In fact there are only a few cases of public schools in segregated areas that can serve as an atypical case—cases that show higher outcomes than the average.[117] Therefore, atypical schools are for the most part private and show a higher socioeconomic status than typical schools, which, for the most part, are public schools. In addition, the only atypical school that is public also has a higher socioeconomic status than its typical counterparts. This means that we can expect that one of the reasons why social mediators—parents, teachers and peers—in atypical schools behave differently—if there are any—is the higher socioeconomic status of the educational community in general, notwithstanding the socioeconomic status and the level of segregation of the neighborhood in which the school is located. Again, this situation is a byproduct of the high level of school segregation in the Chilean educational system.

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116 In fact, a battery of possible schools were selected in each category: typical and atypical. On January 2006, a letter was sent to the directors of these schools and several phone calls were made to engage them in the research. On March 2006 I received confirmation of participation from the selected schools. Interviews were carried out between April and September, 2006.

117 There are only 5 public schools in the poor and segregated neighborhoods of the city of Santiago that have test scores at or slightly above average. One of these schools is the atypical case in the second neighborhood.

Table 6.1: Main characteristics of selected schools

Neighborhood	Category	Type /a	SES	SIMCE (Math) 2002 /b
El Castillo	Typical	P	Medium-Low	203
	Atypical	PS	Medium	283
Valle de Azapa	Typical	P	Low	199
	Atypical	P	Medium-Low	265
Peñalolén Alto	Typical	P	Low	230
	Atypical	PS	Medium	238

Source: National System for the Measurement of Quality of Education, SIMCE. See www.simce.cl.
a/ P= Public School, PS= Private Subsidized School
b/ Average SIMCE in 2002 is 252 points.

Typical schools in segregated neighborhoods are characterized by a high degree of disorder and lack of hygiene. Dog excrement and street dogs themselves can be found inside one of these schools. In general, there is minimal control of who enters the building; in fact, the doors in these schools are open and unattended most of the time. Children can be found wandering outside the classrooms at all times, which suggests insufficient adult supervision and control. The typical school in the non-segregated neighborhood is not very different in this sense. This school also shows a simple and outdated infrastructure, and a sense of disorder among students. Gaining entry is also relatively easy, despite the relatively large number of adults inside the building.

By way of contrast, atypical schools have a more modern and cared for infrastructure, and entrance to these schools in all three neighborhoods is more controlled. One case is particularly noteworthy. The building of the atypical school in the most segregated neighborhood stands out among vacant lots on the left side and crowded lanes composed of self-help housing right across the street (see picture 6.1).[118] The director of this atypical school schools says:

[118] Pictures were taken by the author between March and May, 2006.

> *Instead of a proper distribution of houses, from my office window I can see a pile of shacks, very close to one another. This means that the houses are also overcrowded inside. The house is maybe 40 square meters, and 2 families of 5 people each live there. Then you have 10, 11, 12 people crowded in one tiny house.* [119]

Thus, beyond the evident difference in the quality of infrastructure, the main difference between typical and atypical schools is the feeling of order and adult supervision. There are two features of this atypical school that catch the observer's eye and that reflect the relatively high degree of adult supervision. In this school, children are bused to and from their houses, which is a very uncommon practice in these types of settings (see yellow vans aligned in front of the school in picture 6.1).[120] On the other hand, mothers are required to be involved in the activities of the school. For instance, picture 6.2 shows a group of parents signing children's copybooks. In contrast, the typical school in this neighborhood—which is located only a couple of blocks away—looks vandalized and uncared for (see picture 6.3). These contrasts between the typical and atypical schools are similar in the other two neighborhoods.

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119 "Desde la ventana de mi oficina uno ve una suerte de apiñamiento de casas, no una distribución de casas y eso también se traduce en apiñamiento interior de casas, de los moradores. Es habitual que un porcentaje importante de alumnos sus padres son allegados, entonces en una casa usted puede (…) la casa tendrá 40 metros aproximadamente, y viven a veces 2 familias, cada familia de alrededor de 5 personas, luego viven alrededor de 10, 11, 12 personas en una casa"

120 Although many of the students do not belong to the neighborhood where the school is located—therefore the buses—a group of students actually live in the Villa el Castillo. Mothers in this study are the ones that live there.

Picture 6.1: Self-help housing and vacant lands adjacent to the atypical school in Villa El Castillo.

Picture 6.2: Mother's supervision in atypical school

Picture 6.3: Typical school in Villa el Castillo

6.2 MAIN RESULTS

This section presents the main results of these interviews. The findings will be presented in a general fashion; however, the differentiation of the cases helps in establishing differences between more and less segregated areas.

As described in the previous section of this chapter, there are clear differences between typical and atypical schools. These differences are so strong that they tend to eclipse the differences between similar schools in segregated and non-segregated areas. In fact, I would argue that this is one of the main reasons why public policies have stressed the importance of school characteristics as opposed to the importance of the areas in which these schools are located. Thus instead of presenting a systematic analysis of the differences between neighborhoods and between educational communities, this collective case study is aimed at pinpointing some elements that may be critical for the socialization of children.

The main results are organized into four main topics: the subjective experience of living in poor and segregated neighborhoods, parental supervision and the school-family bond, the formation of expectations, and the normative environment in the community. Finally, the chapter provides a general view of the findings.

6.2.1 The Subjective Experience of Socioeconomic Segregation

One of the main shortcomings of the quantitative analysis presented in the previous chapters refers to the possibility that the "neighborhood" has different meanings and thus different boundaries for different people. The quantitative analysis delineates the neighborhood as the census district in which the school is located and does not distinguish layers of sociability inside this area.

The interviews reveal that, in fact, the neighborhood is a dynamic and layered concept. The concept of "barrio" can be considered as dynamic, since it changes throughout the interview, including proximal and distal layers of sociability. During the first stages of the interview, mothers describe their neighborhood as their street, or even a couple of houses in the street, which can be interpreted as a tendency to relate to those whom they know best. Thus, the word "barrio" brings to mind the idea of a close-knit community of people connected to each other by strong ties (Grannovetter, 1973). For instance, one mother tells us that *"her neighborhood is the sidewalk in front of her house*".[121] And she adds:

> *"The thing is I work outside the whole day. So, I get home and I spend the rest of the time indoors, cleaning, helping my daughter with her homework. I don't have much time to socialize in the neighborhood".*[122]

However, as the interview unfolds, the boundaries of the neighborhood expand. In general mothers recognize "strangers" and layers of sociability within the neighborhood. Thus, as the conversation develops, mothers acknowledge that their neighborhood goes beyond the limits of their local strong ties. In doing so, mothers need to establish some differences between different parts of the community. For instance, this mother from El Castillo mentions two distinct parts of the villa that are placed within the neighborhood.

> *"I mean, this neighborhood is known as El Castillo. But we are all different even if they think we are all the same. For instance, that part is known as 'Lautaro' and the place where I live is known as 'El Ombu'…".*[123]

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[121] "Ay, mi barrio es la acera de mi casa"

[122] Es que trabajo todo el día, entonces llego a la casa y me encierro, aseo, la niña, las tareas, al otro día trabajo temprano así que no (…) no convivo mucho en el barrio.

[123] "…o sea todo este entorno es (…) El Castillo, pero no po', somos diferentes partes pero igual nos catalogan a todos iguales, (…) por ejemplo esa calle de al frente, de los departamentos, se llama Lautaro parece, esa población. Por ejemplo acá, donde nosotros vivimos se llama El Ombú".

There is a spatial differentiation of contrasting circumstances inside the neighborhood. Mothers recognize a more distal geography that everyone calls the neighborhood, but they are inclined to recognize differences inside this wider space. In this recognition of differences there are the "good places" and there are the "bad places".

In contrasts with teachers' and principals' opinions that the neighborhood is rather homogeneous in terms of insecurity and violence, a group of mothers considers their own space as the safe place, even though it is reduced to one or two streets. In fact, adults from outside the community are not able to differentiate whether danger is relatively limited to one part of the community. Actually, teachers and principals recognize that danger is everywhere. However, they tend to differentiate certain times that are more dangerous than other times of the day. As the principal of the atypical school in the most segregated area expresses it:

> *"The main problem in this neighborhood is the feeling of insecurity. Maybe you can move around fairly easily during the day, but at night the scene radically changes. A different kind of crowd occupies the streets at night (...).At 8 p.m. buses stop entering the neighborhood. They don't enter very early in the morning either. If so, it is very likely they will be robbed. It is also dangerous for our students to leave the school after dark. Some of them have been robbed. We have to be very careful"* [124]

In contrast to the opinion of the adults from outside the community, some mothers consider that their situation is acceptable because they think the situation of some people

[124] " los principales problemas del barrio opinando desde lo que se ve acá, desde el colegio, es la inseguridad, la sensación de inseguridad que tienen nuestros alumnos y nuestros apoderados. Ahora, uno sale a caminar por el Castillo y está bastante tranquilo, bastante normal, uno puede circular sin problema, quizá pa''l lado rural no se sabe, pero cambia el escenario una vez que comienza a anochecer, también cambian los públicos que andan en la calle, cambian los roles de dominio, al parecer, en este momento duerme La Pintana que despierta cuando comienza a anochecer no? Y, fenómenos como por ejemplo, las micros no entran al Castillo desde las 8 de la noche, por ejemplo, y en la mañana no entran sino desde una hora determinada porque, bueno, saben que es exponerse a una situación más o menos cierta de ser asaltado. También nuestros alumnos, salir del colegio más allá de una determinada hora es riesgoso, las inmediaciones, lo más próximo no hay problema pero comienzan a caminar 2 o 3 cuadras hacia el interior del Castillo profundo y el riesgo es grande. Algunos de nuestros alumnos han sido asaltados, (…) hay que tomar muchos resguardos"

who live nearby is considerably worse. In this sense, this group of mothers does not recognize themselves as part of the chaos that teachers and principals describe as general to the community. For instance, a mother, asked to classify her neighborhood says: *"I would say that my neighborhood is good. Over there is bad. Over there, we call it the lawless town".*[125] And she continues:

> *"They always think the worst of us; of all of us who come from La Pintana. And I can say that that is not true, because there are places and there are places. Not every part is the same".*[126]

This layered concept of "barrio" explains an apparent contradiction. Mothers in general acknowledge the existence of drugs, delinquency, violence, and disorder in the area. However, some of them declare that their proximal context within the neighborhood is quiet and livable. This differentiation of spaces within a broader area corresponds to the necessity of building a place in which mothers can establish an identity that outshines the chaos in the area. For instance, picture 6.4 illustrates the way a mother from the most segregated area assesses insecurity in her neighborhood.[127] In her drawing, she places the "lawless town" just a few blocks away from her house, in the red area that covers more than half of the page. However, she also asserts that "her place", the street where she and her family live, is rather quiet and livable. In her drawing, she marks a couple of streets in black which correspond to the areas where she feels safe and comfortable. This mother is somehow constructing a safe area inside a bigger space that she herself considers as dangerous.

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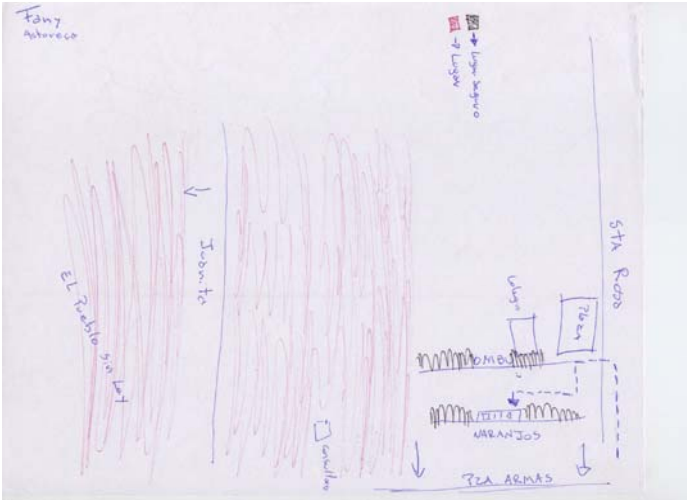
[125] Si tuviera que clasificar a su barrio entre bueno, regular y malo ¿Cuál escogería? El mío bueno. Pa' allá es malo, pa' allá pa' la población pueblo sin ley, pa''l fondo

[126] Como siempre lo catalogan mal po', La Pintana, La Pintana, todo La Pintana, lo más malo viene de La Pintana, y no es así, porque hay lugares y hay lugares, (…) todas las partes no son iguales".

[127] During the interview, mothers were asked to make a small sketch of the limits of their neighborhood. In addition I asked them to paint in red and black the areas that they considered more dangerous and more safe respectively.

Picture 6.4 Subjective appreciation of segregated neighborhood



Another mother's opinion helps us to understand the level of threat these families experience on a daily basis. She is more specific about the problems one can encounter in the "lawless town". What is interesting about this quote is that she is able to joke and laugh about how dangerous the area can get. This might mean that the deviant behavior associated with violence and drugs has already been normalized and accepted as part of the characteristics of the environment.

> *"If you enter that part of the neighborhood, you will leave it naked (laughs). Seriously, I once went there around 8 at night and it was just like going to the market. But instead of offering clothes, they were offering drugs. Everyone offers young people drugs, even grandmothers (laughs)".*[128]

[128] Pa'llá, pa'l pueblo sin ley (…) el que entre pa' dentro (…) salí' cala'o y toda la cuestión (risas) como la sandia que salí' cala'o así. Es como que lo más malo pa' allá po'. No, y es verdad, […] tuve que ir a la comisaría y esta comisaría queda pa' allá, pa'l pueblo sin ley, y fui en la noche, o sea, ya se estaba haciendo de noche, eran como las 8. Fui con una amiga (…), y sabe que es como ir a la Estación Central así, no ve que Ud. va a comprar y le ofrecen la ropa así, pero aquí pero aquí es distinto, le ofrecen la droga 'oye, andai buscando (…) aquí hay, ya tanto'. Todos salen así a ofrecerle los cabros. Último de marginal así. Y las abuelitas así pa' allá así igual (risas) es como que está la escoria pa' ese lado así, bien feo pa' allá.

The trivialization of deviance has profound implications for children's development. This is an indication of an unclear normative environment. I will go back to this topic shortly.

Another important topic about the subjective experience of living in segregated areas is the feeling of isolation and stigma. In general, mothers do not feel isolated even though they recognize they have to travel at least one hour if they want to go to the city center. Although the majority of these mothers do not own a car and have to use public transportation, they seem to be adjusted to the idea of lengthy commuting times. However, mothers in segregated neighborhoods recognize that their neighborhoods are stigmatized, a fact that has concrete consequences for them and their husbands. Mothers mention that among the consequences of stigma are the lack of possibilities for finding jobs and having access to credit. As one mother puts it:

> *"When my husband went to a job interview and said that he was from El Castillo, they would never call him back. Personally, I went to ask for credit in a store and they asked where I am from. When I said I am from La Pintana they told me they do not give credit to people from my neighborhood"*[129]

Thus, one of the readings of the narratives from the interviews in segregated neighborhoods refers to the stigma. This sense of being considered as "second class citizens" or being socially neglected appears to be more important than the feeling of physical isolation from the rest of society. The narratives also suggest that, in spite of social disdain, some mothers do not consider their more proximal context as deviant.

[129] De repente mi mismo marido cuando iba a entrevista de trabajo decía que era de La Pintana 'no, te vamos a llamar', te llamamos, sí, y casi todos es lo mismo, toda la gente así (…) las casas comerciales Ud. le dice soy de tal comuna 'ah, no'. Yo fui a una casa comercial a inscribirme, que me gustaba esa casa comercial 'y de adonde soy tú?' de La Pintana 'ah, noo (…) mira, no es que no te quiera inscribir' me dijo la niña así, mira, nos mostró el libro, salía toda La Pintana, las calle Eleuterio, El ombú (…) Los Morros, así distintas, estas partes (…) no, a esa gente no le dan (…) tenían sectorizado las calles, las poblaciones que no accedían al crédito

These mothers are less aware of the need for adult supervision of children when they are in the streets. On the contrary, mothers that recognize that delinquency and violence are to some extent a generalized problem in the neighborhood tend to be more conscious of this need. This finding brings about the need to explore this issue in depth.

6.2.2 Adult supervision and the school-family bond

The theory of neighborhood effects states that one of the reasons why concentrated poverty is detrimental to children's development is due to the lack of parental supervision and the insufficient collective efficacy for children.

As suggested in the previous section, some mothers are not able to place themselves as living in a violent and dangerous place. They believe their situation is normal while another person's situation is not. These mothers, who tend to normalize the neighborhood's circumstances, sometimes let children go unsupervised in the street.

> *"Sometimes my children spend the day in the street and I see them with other children who are on drugs. They are not delinquents or anything, they are just stoned. I know they are not bad people but they are on drugs and it is scary".* [130]

The trivialization of danger is not common to all mothers in the neighborhood. On the contrary, mothers from the atypical school in this neighborhood tend to recognize that the environment is dangerous and that children should not be unsupervised when they are in the streets. In other words, it is possible to think that the recognition that there is danger across the entire community, not only in the so-called "lawless town", allows mothers to be more alert and to understand the need for adult supervision when children

130 "A veces mis hijos se quedan en la calle y los veo con otros niños que están en mal estado y a mí me da miedo, no digo que son delincuentes, no me refiero a eso pero son niños que son "vola'itos" y eso es lo que me da miedo a mi po'. No digo que son asaltantes, delincuentes, no, me refiero a que a veces están con su cuestión de droga y dan miedo, dan miedo"

are in the street. One mother from the atypical school in one of the segregated areas explains:

> *"We have a park that we cannot use because is full of drug addicts and alcoholics. I don't let my kids to go outside because I don't want them to see that kind of thing. Since I work the whole day they have a house key so I tell them to lock themselves in until I get home. They are not allowed to go outside if I am not there".*[131]

The existence of both strategies within the same neighborhood suggests that there are individual differences and different strategies for coping with deviance in the neighborhood. Unfortunately, the interviews do not allow for pinpointing the individual characteristics explaining the reasons why only some mothers consider that parental supervision is important, while others do not act accordingly. However, the analysis of the interviewees shows a clear correlation between coping strategies and school affiliation.

Interviews suggest that some schools have an active role in generating awareness about the need for parental supervision, and some schools do not. Schools that foster a stronger school-family bond are, in a sense, fostering parental supervision. As mentioned above, the example of "busing" to and from home and the sight of mothers signing children's copybooks at the entrance of the school are clear examples of active encouragement of adult supervision. However, one cannot conclude that these are common practices. On the contrary, there is a relatively larger amount of examples that counter these practices, mostly in segregated areas. For instance, a teacher from the typical school in one of the segregated neighborhoods complains about the lack of parents' commitment to the education of their children.

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[131] Porque es un área verde que tu podrías ir a pasear, pasarla bien pero no se puede, porque yo por lo menos, las veces que he pasado por ahí hay puros drogadictos, alcohólicos, juventud (…). Yo no dejo que ellos salgan porque no quiero que vean esas cosas. Como yo trabajo todo el día, ellos tienen llave y les digo que se encierren en la casa hasta que yo llegue. Tienen prohibido salir a la calle si yo no estoy".

"There is a big problem with the family. There are too many dysfunctional families: teenage and absent parents, even absent mothers (…). Mothers want the school to give them everything and they don't want to give anything back. They feel they are doing you a favor by sending their kids to school. They do not care whether the kids show up or whether they have their book. They show no commitment to their child's education. Parents are indifferent about what happens to their children. I see a lot of irresponsibility. Maybe it is because they are too young or because they are too worried about surviving every day. It's not their option, but I think they don't even know what it means to be a parent."[132]

However, parents are not the only ones to blame for this lack of commitment. In fact, many times teachers themselves do not create the conditions for parents to be more involved. A teacher in the typical school of one of the segregated areas says:

"To me, the free access that parents have into the school is very irritating. They do not care if you are having lunch or having a break; parents come at any time".[133]

This indicates that there is a shared responsibility between parents and the school in order to carry out effective adult supervision. Parents' and teachers' lack of trust in each other prevents the creation of the conditions for this to occur. There are several examples of this lack of trust. This mother, for instance, says that teachers blame parents for the bad quality of the school, at the same time, teachers complain that parents do not trust them and have a constant need to control the situation:

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132 "…hay mucho problema a nivel familiar, muchos hogares disgregados, hay muchas familias disfuncionales, mucho adolescente papá, papás ausente y mamás ausentes también (…) quieren que tú todo les des y ellos a cambio no dan nada, poco menos que (…)te están haciendo un favor al mandarte al chiquillo al colegio, no, no le interesan, por ejemplo, si tienen o no tienen libro, (…) o no los mandan, eh cero compromiso (…). Hay un tremenda, mucha despreocupación por los hijos, mucha irresponsabilidad (…) Y los apoderados por ejemplo, por la lucha del vivir día a día, despreocupan todo lo demás, yo no sé si por ser papás jóvenes (…) no creo que por opción, por la ocasión yo creo (…) pero yo creo que ni ellos saben lo que es ser papás...

133 "es el libre acceso de los apoderados a la escuela, a mí me molesta mucho, aquí no, aquí no hay diferencia si tú estas en colación y que tú estás en clases, los papás de los chiquillos pasan a la hora que quieren, no te respetan la hora de colación, tú estay almorzando de lo mejor y (…) Eso es lo que no me gusta a mí, el dejar hacer tanto a los apoderados y a los niños po. A lo mejor por eso se han presentado tantos problemas conductuales este año. Y ahora están tratando de mejorar esa parte."

> *"The other day I had a problem with some teachers that were telling me that the school was not bad. They said that parents are the ones making the school be bad"(mother).*[134]

> *"According to the principal, parents do not trust our work. That is the reason why parents come to the school so often. They basically want to keep an eye on us" (teacher).*[135]

On the other hand, teachers in atypical schools are more aware of the need for working together with parents. The director of one of the atypical schools in segregated areas is very eloquent in arguing that one of the missions of the school is to build a relationship with the entire family and not only with students.

> *"Education is not only about the relationship between school and student. It is fundamentally about the relationship between the school and the family, through which we build a relationship with our students. Our educational project involves the entire family because we believe that parents are the first educators".*[136]

These illustrative quotes call attention not only to the lack of parental supervision in the typical educational communities, but to a more profound lack of commitment and lack of knowledge of the school's culture among parents in these communities. In fact, one teacher from a typical school suggests that parents cannot contribute to their children's education because they are not able to adopt the school's culture and to stand against the deviant behavior that is so common in the neighborhood.

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134 "la otra vez tuve un problema con unos profesores si me decían que el colegio no es el malo, son los papás que hacen que el colegio sea malo"

135 "la directora dice que los apoderados no tienen confianza de nuestro trabajo por eso vienen tanto a la escuela, a vigilar qué estamos haciendo con sus hijos".

136 "…el tema de la educación no es una relación colegio-alumno sino que es una relación fundamentalmente colegio-familia, colegio-familia, ¿no? Y lógicamente vía el alumno pero la relación es colegio-familia. Entonces, existe un proyecto educativo claro que involucre a familias y considere, nosotros pensamos ¿no? Que son los padres los primeros educadores."

"I think we should educate the adult population first. Otherwise this is a vicious circle. What happens in the household is opposite to what happens in the school. These parents bring the neighborhood into the house".[137]

These quotes are closely related to what was found in the quantitative analysis. The hierarchical cross-regressive multilevel model suggested that children in segregated areas profit more from the school-family closeness because their parents are seldom exposed to the ethos of the medium and upper classes which is also dominant in the schools. This closer bond between the school and the family allows bridging the cultural division that prevents cooperation between parents' and schools' objectives and rules.

Mutual collaboration between parents and the school is only possible if both parties have similar expectations about the relevance of schooling for life opportunities later in life, and about the possibilities of following a formal educational path. This brings to mind the idea that the cultural division between parents and schools in segregated neighborhoods is due to either divergent expectations or to expectations that, in neither case, are directed to better educational outcomes.

6.2.3 Information and expectations

The theory of neighborhood effects stresses the importance of the neighborhood in the formation of parent's and teacher's expectations. It is likely that parents form expectations about returns to schooling by observing other families in their neighborhood (Jones, 1998 p.62; Binder, 1999 p. 311).

Social isolation brought about by socioeconomic residential segregation implies that the segregated population is less exposed to the standards in the rest of the society.

137 "Yo creo que por ese lado falta educarlos a ellos, habría que educar a la población adulta primero, porque eso imagínate, es como un círculo vicioso po'. No hay una réplica de lo que pasa en el colegio en la casa, traen el barrio a la casa"

This isolation hinders the attempts to compare the quality of education in relation to other schools. In other words, schools in segregated areas serving a socioeconomically homogeneous population set certain standards that are seldom questioned by users, due to the fact that there are no reference points through which to judge quality and change.

As an example, some mothers choose schools based on the knowledge they have at hand. Proximity to home and previous experiences with the institutions are the most important factors for choosing a school. As one mother in the typical school in the most segregated area tells us:

> *"I chose this school because it is closer to our home, because it is located in my neighborhood. Besides, my oldest children and my nieces and nephews all went to this school. So I know it well. I feel close and comfortable in that school"*[138]

Once the choice is made, it is seldom questioned. In general, mothers from typical educational communities have a good opinion of the school. However, opinions are often unspecific regarding the quality of education and the relative performance of the school. For instance, this mother appears to be rather happy with the school even though she has been warned of the low quality of education as compared to other schools in the area.

> *"I will stay in this school first because it is close to home. I have neighbors that have moved their kids to other schools in which they have to pay. I say that they are throwing their money away. They think that the school is good because they pay for it. Many have said to me that I should move my younger daughter to another school; that she is lost if she stays here. But I will not move my daughter to another school".*[139]

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138 "(...) me queda más cerca de mi casa, porque realmente me pertenece como sector, me queda más cerca, mis hijos mayores, sobrinos y sobrinas se educaron aquí, tengo un acercamiento con el colegio, le tengo cariño…".

139 "Primero, porque está aquí al frente de la casa, (…), yo tengo vecinos que los han cambiado pa' otros colegios que pagan (…) regalan la plata, según ellos es buen colegio al ser pagados (…) si a mí me han dicho, saca a la más chica, la de 10, que tiene buenas notas la niña, (…), 'sácala porque aquí en el colegio la niña se va a perder' ¡no! No la voy a sacar".

The rational long-term expected returns of education—upward mobility—appears only when mothers are prompted to refer about these types of returns, but in most cases, opinions are uninformed and unspecific. Thus, the latter quote shows that this mother, as do many other mothers, seems to be more focused on other features, such as location. In fact, the issues of educational outcomes, cognitive development, and learning in general, are seldom mentioned by mothers in typical schools. Still, they are rather satisfied with the school. When the level of socioeconomic segregation is high and the immediate social context is socioeconomically homogeneous, information becomes imperfect. Thus, we can argue that families in segregated areas suffer from an important degree of informational asymmetry that might explain this contradiction between satisfaction—reflected in this case, in the willingness to stay in the school—and the measurable indicators of the quality of education.

Thus, we can argue that information is crucial. One mother from the atypical school in a non-segregated neighborhood who seems to have more access to information about quality of schools in other parts of the city argues that the reason why she is satisfied with the school is because she thinks the quality of education is good "as compared" to the quality of education in other schools. In her own words:

> *"I compare my son's copybooks with my nephew's copybooks and they are about the same. I compare them with my other's nephew's copybooks, who is in a public school, and I feel my son is OK"*[140]

Information allows parents to question their own reality and to identify the most serious problems in the community.

> *"Children are aggressive and disrespectful. They do not respect anything and refer to each other using only foul language. I don't like these things*

[140] "…yo comparo algunos cuadernos con los mi hijo, (…), están casi igual, y lo comparo con mi sobrino que también está en colegio municipalizado, y que son de otras comunas, y lo veo re bien al mío…".

and I don't want that for my children. I will probably take them to another school because of that".[141]

In socially isolated areas the information is biased. Thus, the schooling path for upward mobility becomes fuzzy. For instance, a mother who declares she is very satisfied with the school is asked about her expectations for the future of her child. In her answer she shows ignorance about the educational path that is needed for certain careers. She actually links college as a prerequisite to be a police officer, which is not the case in the Chilean system.

"I would like my son to go to college and be a professional, to be someone more important than us. I want him to be a cop. I want my daughter to go to college so she can be a detective".[142]

When the educational path required for social mobility is unknown, it is more rational for families to center their attention on the short-term benefits of schooling. These benefits are associated with the moral-socialization intention of education rather than with long term benefits and output-oriented intentions (Luhmann, 1996). Thus, the utility function of families in segregated areas is more related to immediate needs such as protection and socio-affective care. In a similar fashion, Thompson (2003) finds that one of the strongest predictors of parental satisfaction with current quality of education among African American families is their evaluation about whether teachers actually care about students. Similarly, one mother says:

"I like this teacher because she teaches them to behave. For instance, she teaches children to say the "magic" word (please) when they ask for things. She does not just make them say "please". She has a good way of

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141 "Agresivos, sin respeto, en un 60% son así, que no respetan nada, salen el garabato ahí afuerita 'oye tal por cual' cosas que a mí no me gustan, entonces eso es lo que yo no quiero para mis hijos, no quiero (…) me los llevo por eso"

142 "Ay, a mi me gustaría que mi hijo fuera (…) alguna profesión, que llegue a la universidad, no sé, quiero que sea alguien más grande que nosotros. … que sea carabinero. Y quiero que mi hija ahora se enliste para ser eh estudiante, investigaciones, ahí en la universidad (…)"

teaching children how to behave. Now when my son asks for a piece of bread, he says "please" so I know what he is learning from the teacher". [143]

According to teachers, education is valued by parents not only by the socio-affective care their children receive from teachers but also by the possibility of transfers of goods such as food and clothing. In this quote, the teacher from the atypical school in one of the segregated areas suggests that

"Parents are opportunists. They want us to give them a lot of food, clothes, books… they come to ask for everything (…) they do not know what education is for but they know brands very well. For them having "things" is really important. Education is like in 20th place on the list. Having things is more important" [144]

Community residence not only explains the education that parents desire for their children It also determines teachers' expectations about future schooling returns for their students (Bauder, 2002). Teachers often adjust their expectations to the reality of the neighborhoods. In doing so, they create a scale of needs they are required to fulfill before they feel children are able to learn. These needs, which are supposedly fulfilled in the household, have to be taken care of by the teachers. This shapes the school's expectations about how far the students will go in the future. As one principal describes it,

"This school is shaped based on the characteristics of the neighborhood. What I have learned as the principal of this school is that the best you can do with a population having these characteristics is to help them to be "civilized"; make sure the children eat, wash their hands, their teeth. (…) The idea is that teachers should love and protect their students so they can

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143 "(…) y le enseña modales a los niños por ejemplo, me pasa esto, di la palabra mágica, por favor, entonces igual les enseña a sí a los niños, no ¡oye tienes que decir por favor! No, no es así. Y uno igual aprende, por ejemplo los niños le dicen Marcel dame un pedacito de pan, y cuál es la palabra mágica, entonces el lo aprende. Se nota lo que está aprendiendo de la profesora."

144 (…)los papas son oportunistas, ojalá les demos mucha comida, muchos cuadernos, muchos lápices, eh (…) porque ellos vienen a pedir de todo. No saben para qué sirve la educación pero de eso si se manejan po', las marcas, (…), la parte material para ellos es como lo importante, yo creo que la educación lo deben tener ni como en el décimo veinteavo lugar del (…) no, si es cierto. Lo material es lo importante, pero lo demás no (…).

slowly get interested in learning. We need to offer an alternative to the life they live in their neighborhood, and make it look more attractive, more affective and more hopeful". [145]

As suggested in the quantitative analysis, teachers in these schools do not have high academic expectations for their students, because they know the conditions of educability among the majority of these children are far from satisfactory. Thus, mothers, teachers and principals adjust their expectations to what is actually possible. In doing so, they acquire a sense of mission that is more related to the socialization of children, instead of to the role of facilitator of learning. Thus, success is evaluated under this perspective, and teacher satisfaction in deprived areas is sometimes connected to children's social development rather than their cognitive development. For instance, this teacher bases the success of the school on outputs that are not commonly measured because they are taken for granted in most settings. She also justifies the difficulty in focusing on cognitive-related objectives due to the less than ideal context in which children develop.

"I see mothers bringing their children with clean clothes, clean hair, clean shoes, and I feel successful. I see children playing and having lunch in order, I see children who have learned to wash their hands and their teeth and I feel my school is successful. These results are not measured but they are important on a daily basis. Some days are terrible; we have to send 15 children to the hospital, mostly on Mondays when they come so aggressive. I feel teachers sweat trying to calm these children down and to

145 "…Esta escuela se fue construyendo a partir de las características del barrio. Eh (…) los alumnos son como pasivos intelectualmente y muy inquietos racionalmente, con poco asombro cognitivo ¿me entiendes tú? Poco asombro cognitivo (énfasis) , los padres lo mismo, entonces vienen a ras de las emociones primarias, a ras (…) entonces, lo que yo he observado como director, es que hay que tratar de mantener a esa población con esa característica, en las mejores condiciones urbanas posibles, primero que lo que está dando el sistema como almuerzo, eh (…) con la jornada completa para mantenerlo acá, un módulo mental, eh tenerlo como al día en esas cosas, que eso se cumpla (…) que se lave las manos, que se lave los dientes, etcétera. Y que los profesores puedan hacerlos como pensar y quererlos dentro de la sala po', y protegerlos, cosa que los alumnos poco a poco se vayan interesando en eh (…) en una especie de, de vida alternativa a la vida de los barrios, que esta vida aparezca como más interesante, más atractiva, más afectiva y con mayor esperanza, que los barrios. Eso es un poco lo que nosotros estamos dando, porque los barrios en sí yo creo que están condenados esto a, a multiplicarse, a replicarse al infinito y en forma degradante.

teach them something. But as the week unfolds and they calm down some days you can do something".[146]

However, atypical schools make an effort to focus on education as a means for social mobility. In this sense, atypical schools make a conscious effort to set high expectations for their students, even if parents are not cooperative with this objective. The principal and one teacher from the typical school in one of the segregated areas tell us about this objective and the strategies to reach them respectively:

"Our goal is for people to believe in education as a means to get away from poverty. I think this is the most important thing: that people have faith and that they understand that there is no other way of moving up. (principal)"[147]

"I need to find a way so these children have opportunities in their future. This is my mission. If parents help me, great. If not, I just let them go. Anyway, I have to think that I help these kids myself, so they learn. I know that what they learn they learn it here, not at home (teacher)."[148]

In other words, one of the reasons for this noticeable cultural division between the school and the household refers to the expectations about what schooling means and how it fits in the parent's life plan. Many mothers from segregated neighborhoods cannot

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146 (…) yo veo a las mamás traer en la mañanitas a sus hijos con los zapatos lustraitos, con su cotona, con su pelo limpio, yo veo que ahí estamos bien. Que los alumnos juegan, que van en forma ordenada a almorzar, que ya tienen hábitos de lavarse las manitos, de lavarse los dientes … esos son buenos resultados, son, esos son resultados que no se miden, claro, no se miden, son una fenomenología del día a día, que a veces son días terribles donde hay que mandar a 15 alumnos a la posta, sobre todo los días lunes que llegan con una agresividad pero increíble, llegan con el peso del fin de semana acá po', son días terribles que uno tiene que estar acá pero como loco, y me da la impresión que en la sala de clase los profesores sudan la gota gorda tratando de, de calmarlos y tratarles de enseñarles algo. Pero en la semana ya se va calmando y hay días santamente serenos po', los martes, los miércoles, hasta por los jueves, pero que se pueden hacer algo (…) algunas clases más formales, algunos contenidos distintos.

147 "Nuestra meta es lograr que la gente crea en la educación como un medio para salir de su pobreza, creo que eso es lo más importante, que la gente crea y tenga fe que no hay otro medio para salir de donde está si no es mediante la educación (…)".

148 "(...) yo siempre pienso aquí que tengo que ver como me la ingenio pa' que estos niñitos salgan adelante, qué hago yo, y el apoderado si me ayuda, que rico, si no, lo suelto. Yo tengo que pensar que las cosas las hago sola, aquí muchos, la mayoría de los alumnos aprenden a leer, y lo que aprenden lo aprenden en el colegio, no por lo que le enseñen en (la casa) (...)" (Profesora Jefe, Colegio Renca).

appreciate the value of education. They tend to favor short-term benefits such as affective care and food transfers rather than long term benefits such as cognitive development. Sometimes schools are aware of the difficulties of reaching cognitive goals, given that the most basic needs are not satisfied and they decide to adopt the mission of being caregivers, saviors—as one principal puts it. Other schools consciously go against the flow, and set high expectations for their children even if, in the back of the teacher's brain, there is the recognition that the household situation is not ideal for this aim. In any case, the result is that school and parents do not work cooperatively toward the goal of learning.

6.2.4. Normative Environment

Another reason for the lack of cooperation between the school and the family is that norms are divergent in both settings. As stated in the theoretical framework, children who grow up in communities where norms and values are clear and actively enforced by the adult population will be more likely to comply with school requirements and will do better in school. As was suggested in the previous section, this division between the neighborhood's culture and the school's culture is an indication of the opposite tendency.

This divergence between school and neighborhood makes it difficult for teachers to focus on learning, and some have no other option but to focus on creating the conditions for learning. The main difference in atypical schools is that parents are prompted to get involved in their child's learning process. They have to sign copybooks, they have to attend school meetings and they—as well as their children—have to comply with the school's normative structure. Moreover, enrolment in atypical, more competitive schools—mostly private—is more difficult than enrolment in public schools. Thus, the fact that parents are willing to go through the selection process is an indication that they

are also willing to follow the school's rules. As stated in the conclusion of the quantitative analysis, this parent-school bonding is particularly beneficial for these children.

Thus, it is worth exploring the normative environment in which these children live in order to pinpoint the elements of the norms in the community that are more divergent from the norms in the school.

One issue that is repeatedly mentioned by the mothers in segregated areas is that neighbors do not provide a good example for children. Neighbors in general are not mainstream-oriented role models. Many mothers' stories include a certain number of thieves, alcoholics, or drug dealers among their neighbors. In spite of the recognition of deviant social behavior, many mothers justify these conducts or even declare having a set of exceptions in which, for instance, stealing is a legitimate activity. One mother, for instance, declares that "her neighbors are good people because, since they steal, they can keep their children well dressed".[149] See for instance the story of Mike and his "uncle" José.[150]

> *"My son is specially attached to one neighbor, José. He lives next door, and he is an alcoholic. If my son sees Jose is drunk he says 'OK, dad, he can use my bed. Put him to sleep in my bed and he can leave tomorrow". He cares a lot about José. Sometimes he sees him crying and he will be like 'he cries because his girlfriends leave him because he drinks too much'. He tells him: 'you don't have to drink uncle José' 'now go to sleep, you can use my bed'. If José wants to leave to drink some more, my son tells him: 'Uncle José, I will keep your telephone; otherwise they are going to steal it from you somewhere".*[151]

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149 "Los vecinos son buenos porque como roban, pueden tener a sus hijos bien vestidos"

150 In Chile, children call "uncle" or 'aunt" to all adults that have a close bond with. They do not need to be actually related to be called "uncle" or "aunt".

151 "Si po', al tío José, ellos viven atrás, también es bueno así pa', pa' su copete, (…) si lo ve mal mi hijo así, 'ya papá yo le paso mi cama al tío, acuéstalo ahí no más, mañana se va'. Mi hijo, al tío, al que más lo estima, al que más lo admira porque no sé po siempre viene, de repente el viene pa' la casa y siempre lo ve mal, entonces como que, mi hijo no sé, como que debe darle lastima, no sé po', de repente lo pilla llorando 'José está llorando' dice porque no le duran las pololas porque es muy bueno pa' tomar po' y el Mike 'pa

This little story shows a small child that is already more responsible and observant than his role model. Wilson (1987) identifies this lack of role models that ascribe to the norms of the mainstream as one of the main reasons why concentrated poverty in the neighborhood is so important for children's success at school.

Social networks that mothers build are important for the set of role models children have access to. Many mothers willingly make friends with those people whose behavior they consider deviant or even dangerous. Many mothers even accept the neighbors who clearly show deviant behavior into their houses. A closer look at this behavior indicates that the strategy of getting closer to dangerous people is functional for protection. As this mother describes it:

> *"Drug addicts stand in the front of my house to ask for money. I give them what I have and I treat them nicely because since I have my little girl, I think, if I don't do so, something can happen to her. And I get scared very easy"*[152]

Another factor that reflects a soft normative environment in segregated neighborhoods is the lack of trust between neighbors when teaching children right and wrong. In general, mothers do not like for their children to be disciplined by an adult from outside the family. In the same way, mothers do not like to punish someone else's children. As this mother tells us, the problem of a lack of collective efficacy for children is that punishment is associated with violence, and violence results in revenge. Thus, to avoid further problems, mothers often find it wiser to not get involved.

> *"I am not going to punish a child that is not mine. Can you imagine? If I do, the mother would probably kill me. Yesterday one kid from 4th grade*

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qué toma tío' le dice 'no tiene que tomar po'. Ya vaya a acostarse' dice 'yo le presto mi cama' y le guarda sus cosas, el teléfono, de repente se quiere ir, ya, se va y le dice 'ya tío, yo le voy a tener el teléfono y mañana lo viene a buscar porque si no, se lo van a robar por ahí' dice".

152 "Porque están así, se ponen en la puerta de mi casa a pedir monedas, (…)yo les doy monedas y los trato bien porque como tengo mi niñita chica, pucha digo, de repente si no le doy puede pasar algo con la niña, yo soy súper miedosa en ese sentido, súper miedosa".

hit a younger child at school. The mother of the small kid came and hit the 4th grader. The next day the mother of the 4th grader was waiting for the mother of the 1st grader to hit her. But I think it is natural. I am not going to let anyone to hit my child."[153]

Thus, the threat of violence means that children are left unsupervised and they do not have an effective social network in the community to teach them right from wrong. As this mother explains further, the school is not a legitimate mediator in these situations either:

"Maybe she should have taken the 4th grader to the office in the first place, but the school doesn't do anything either…"[154]

In fact, many teachers prefer to stay out of problems between mothers, because they also fear they are going to be hit. One mother tells us about how common and easy it is for parents to enter the school if they want to hit teachers. This school's "open door" policy sometimes puts teachers in danger. Thus, as it was previously mentioned, it is more difficult to establish cooperation between parents and the school in a threatening and violent environment.

"Mothers come to school, get into the classrooms and if they want to hit the teacher, they have no problem in doing so. Maybe they should have more control over who enters the school. In other schools one does not enter the classroom just like that".[155]

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153 "yo no le voy a ir a pegarle a un niño si no es mi hijo po', imagínese como son aquí, capaz que una mamá me espere allá afuera y me mate po', si ya pasó ya (…), antes de ayer un niño, le pegó a un niñito de primer año y vino la mamá del niño de primero y le pegó al niño de cuarto, [al día siguiente] la mamá del niñito [de] cuarto estaba esperándola pa' pegarle a la mamá, la que le pegó al hijo de ella, pero es que yo hallo que es natural, porque (…), no sé po', yo no voy a dejar que (…) cualquiera le venga a pegar a mi hijo po', ¿si o no?,"

154 "Ella tendría que haber (…) tomado al niñito de cuarto y haberlo traído, (…) a la oficina (…) pero es que el colegio no hace nada tampoco…"

155 "llegan las mamás y entran a las salas y si quieren pegarle a la profesora le pegan po, entonces yo digo (…) que si alguien llega vayan a donde la profesora y le pregunten, profesora es verdad que usted mandó a llamar a este apoderado, o una firma de la profesora (…) en otros colegios (…) uno no llega y entra hasta una sala"

It is worth noting that, even though most mothers say that they trust teachers to discipline children, in their statements the main reason why they like the teachers is because they are sweet and gentle with kids. In fact, interviews reflect discontent when they know their children are being disciplined by teachers. This can be interpreted as a lack of collective efficacy that many times even permeates the school.

The threat of revenge also applies to children themselves. Teachers declare that they do not have too many degrees of freedom in order to discipline children. The most important reason is that when children are punished at school, many times parents punish them even more when they go home. Teachers declare that many children are physically abused, and that this situation can trigger further violence against children.

6.3 CHAPTER SUMMARY

The analysis of the case studies presented in this chapter allows us to pinpoint some of the behaviors of social mediators in the neighborhood that have a profound effect on children's developmental process.

Segregated neighborhoods in this analysis are pervaded by a noticeable problem of deviant behaviors such as delinquency, drug addiction, and alcoholism. Maybe one of the more influential factors affecting people's behavior in segregated areas is violence. Violence seems to be shaping not only sociability between neighbors but also the relationship between schools and families. Violence also triggers the most common behaviors that can be considered detrimental for children's education. Collective efficacy is difficult when neighbors do not trust each other. Moreover, it becomes virtually impossible when mothers fear that disciplining another's child may well endanger their own physical safety.

Some schools struggle between the option of creating an open environment for parents so they can be involved in their children's education and the option of protecting the physical safety of teachers and children by closing their doors to the community. The stories reveal that it is not uncommon for parents to seek revenge against teachers and school staff in general when children have been disciplined. Thus, violence is also one of the reasons why teachers have difficulties in disciplining children.

Even though deviant behavior and violence are acknowledged, some mothers tend to normalize these types of behaviors. This is extremely relevant for children's socialization, since the main consequence of the trivialization of deviant behavior is that they have more opportunities to be exposed to violent situations while unsupervised. The interviews reveal that parental supervision is one of the main differences between

mothers from typical and atypical schools, which suggest that the school may play an important role in fostering parental involvement in children's development. In fact, while some schools actively engage parents in children's school life, other schools presented more difficulties in establishing cooperative teamwork between parents and teachers, due to lack of trust and the constant threat of violence.

Lack of cooperative work between schools and parents suggests that there is a cultural division between what happens in the household and what happens at school. In fact, the analysis of mothers' expectations about returns from schooling suggests that there is an inability to visualize the long-term benefits of education. Biased and redundant information and probably the lack of experience in educational mobility means that mothers are not very clear about the educational path required to move up the social ladder. In other words, mothers are not very convinced about the importance of educational outcomes. Thus, the rational answer is to focus on the short-term benefits of schooling. Interviews suggest that mothers are more focused on immediate gains such as socio-affective care and the transfer of goods such as food and clothes.

With regard to this topic, some schools adjust their expectations about the benefits they can provide to their students. If such is the case, teachers perceive that the conditions for learning are so poor that learning itself is impossible. Then, teachers become social workers in the sense that they adopt the mission of providing the conditions for learning, rather than learning itself. Nowadays, the formal school system expects that the provision of the optimal conditions for learning should be accomplished by the household. Other schools consciously set high expectations for their students, even while knowing that these expectations can be a utopia. The problem of expectations is that they are either divergent, or they converge in order to accomplish objectives that are unrelated to learning.

The stories of mothers from typical schools in segregated areas indicate that one of the features of social isolation is the lack of functional role models. Moreover, in the mothers' stories we can see that children are closely exposed to dysfunctional role models that are often inside the family. Sometimes mothers willingly generate bonds with neighbors who show deviant behaviors as a strategy for protection. Other mothers, the ones that recognize that deviance is a general problem in the community, tend to resist the environment and to isolate themselves from the rest of the community.

It is worth mentioning that there are clear differences between what happens in typical schools and what happens in atypical schools. It is important to acknowledge that school segregation and the selection bias it represents may well imply that different behaviors are explained by systematic differences between families from typical and atypical educational communities. However, it is important to highlight that atypical educational communities show behaviors that counterbalance the detrimental effects of concentrated poverty on educational outcomes. In this sense, we cannot sustain that children residing in communities where poverty concentrates are destined to have lower educational outcomes. On the contrary, the detrimental effects can be counterbalanced by family and school characteristics and by collaboration between the two.

Chapter 7: Conclusions

"Places have an impact on our sense of self, our sense of safety, the kind of work we get done, the ways we interact with other people, even our ability to function as citizens in a democracy(…) the places where we spend our time affect the people we are and can become" (Hiss, 1991, xi)

The purpose of this research has been to investigate the effects of spatial concentration of poverty on students' educational outcomes. The general goal of this dissertation has been to "bring back the space" in the analysis of educational outcomes. In doing so, this research has analyzed the structural and cultural implications of concentrated poverty and its effects in the educational arena.

The literature suggests that concentration of poverty within and beyond the limits of the neighborhood is associated with fewer and below-standard educational opportunities. This argument has been developed by the theory of the spatial mismatch (Kain, 2004) and the theory of geography of opportunities (Galster and Killen, 1995). Sociological studies of neighborhood effects argue that concentrated poverty also facilitates a number of socialization mechanisms that are detrimental to children's learning and educational performance (see Jencks and Mayer, 1990; Brooks-Gunn, 1993; Mayer, 2002, among others). In this sense, spatial concentration of poverty is relevant to educational achievement because of its structural and cultural implications.

This research analyzes the effects of spatial concentration of poverty in the context of a school-choice educational system. The Chilean voucher system in education

was implemented more than 30 years ago. Yet, to the best of my knowledge, no other study has analyzed the consequences of an educational system that, in addition to creating considerable school segregation, has been implemented in a socioeconomically segregated urban setting. Due to the high level of residential segregation and the uneven geography of opportunities, the educational system does not guarantee that all children have access to a good quality education at the local level. Since transportation costs can be significant, given the restricted budget of many families from poor-segregated neighborhoods, non-local availability of good quality education does not compensate for the lack of educational opportunities in the neighborhood. In this sense, this research has questioned market models of education that, in Pacione's (1997) expressive words, are "geographically naïve" and socially regressive.

The analysis has addressed several issues that contribute to the understanding and measurement of the effects of concentrated poverty on educational outcomes. First, the spatial distribution of the population has been contrasted with the spatial distribution of educational opportunities in order to gauge the magnitude of the problem of spatial mismatch in education. Secondly, quantitative methods have been applied in order to calculate the magnitude of two spatial processes in education: spatial heterogeneity— or the idea that some educational inputs are more effective in some places than in others; and spatial dependence—or the idea that since the characteristics of the neighborhood are directly related to the distal context, educational outcomes in one place are related to educational outcomes in places nearby. Since spatial heterogeneity and spatial dependence are simultaneous processes, this research has adopted Morenoff's (2003) two-step procedure that combines multilevel and spatial models in order to approximate a hierarchical spatial model that accounts for both processes simultaneously.

Thirdly, through a collective case study, this research has provided a deeper analysis of the socialization mechanisms taking place in segregated neighborhoods and their possible effects on educational outcomes. Although this qualitative analysis was not aimed at explaining patterns of behavior, the interviews provided useful insights for interpreting some of the socialization mechanisms affecting children's educational outcomes in segregated areas.

Let us recall the main questions presented in the introduction of this dissertation: How important is spatial segregation of socioeconomic groups in the city of Santiago? Is socioeconomic segregation related to a particular geography of opportunities? Chapter 4 shows that Santiago has two noticeable clusters of poverty and one large cluster of affluence towards the northeastern area of the city. The primary school-aged population is over-represented in the clusters of poverty, which in combination with the uneven geography of opportunities in these areas can be considered as evidence of the spatial mismatch hypothesis in education (Kain, 2004). Does spatial concentration of poverty affect educational outcomes? Yes, but in an indirect fashion. Concentration of poverty in the neighborhood acts through the attitudes and behaviors of social mediators, mostly parents and teachers. Are there spatial externalities in education? Yes, and they are fully explained by the level of socioeconomic segregation in the neighborhood.

In the following section I summarize the main findings that support these answers to the research questions presented above. Then, I turn to the most important policy implications and some ideas for future research.

7.1 MAIN FINDINGS

As stated in the objectives, this research was aimed at measuring the degree of spatial mismatch in education in the context of a school-choice educational system. The

first objective has been to document the level of spatial segregation of the population, whereas the second objective has been to relate the spatial distribution of social groups across the urban area of Santiago to the spatial distribution of educational opportunities and outcomes.

As was shown in Chapter 4, parents' right to choose schools via the voucher system has not increased the quality of education in the entire educational system. This evidence contradicts the expected results of a voucher system (Friedman, 1955, 1962). In fact, poor children concentrate in schools of poor quality—for the most part, public schools—while wealthy children concentrate in private non-subsidized schools that have systematically better results than private subsidized or public schools. School segregation—or sorting of families in schools of different quality—is accompanied by an unbalanced geography of opportunities at the local level. In fact, as shown in Chapter 4, public education is overrepresented in areas of concentrated poverty whereas private non-subsidized schools are overrepresented in areas of concentrated wealth. Moreover, while families from these areas of concentrated poverty choose local schools, families from areas of concentrated wealth commute longer distances to find the school they prefer.[156] This means that the possibilities for school-choice opened up by the voucher system are considerably more restrictive for families in areas of poverty concentration.

In relation to the second objective, this research has been aimed at measuring two spatial processes in education: spatial heterogeneity and spatial dependence. This research has furthermore been intended to understand the mechanisms that explain the reasons why spatial concentration of poverty is important for educational outcomes. These objectives have been reached by means of a combination of qualitative and quantitative techniques.

[156] See Ministerio de Planificación y Cooperación, Republica de Chile 1998. "Diagnostico y Recopilación de Información de Educación bajo la Perspectiva del Transporte." Santiago.

In a general fashion, multilevel models provide evidence for distinguishable neighborhood effects on educational outcomes. In fact, the simplest of the three-level models developed in Chapter 5 suggests that as much as 16.3% of student's math test scores can be explained by the characteristics of the neighborhood in which the school is placed. This number can be interpreted as a general estimation of the "neighborhood effects".

In addition, spatial models provide strong evidence of a spatial externality in education. This means that educational outcomes in a particular neighborhood are significantly explained by some characteristics of adjacent neighborhoods—the distal context. Spatial models reveal that socioeconomic status fully explains the existence of externalities in education. In other words, a neighborhood's socioeconomic status—as a significant predictor of educational outcomes—not only affects children that are enrolled in schools within its boundaries but also creates the conditions that affect educational outcomes of children enrolled in schools located in the distal context as well.

Socioeconomic status in the distal context—the adjacent neighborhoods—is important for determining test scores in the neighborhood. Take the case of children attending schools located in a poor neighborhood that is, in turn, surrounded by other poor neighborhoods. Spatial models suggest that there is a spatial externality caused by concentration of poverty in the larger geography. In this sense, what spatial models are suggesting is nothing less (and nothing more) than that the effect of socioeconomic residential segregation on math test scores is significant.

Thus, this research provides empirical evidence for two general hypotheses: "neighborhood" or place matters, and socioeconomic conditions in the distal context have an impact on educational outcomes in the target neighborhood. In other words, these general models support the hypotheses of spatial heterogeneity and spatial dependence in

education. Complete multi-level models and the qualitative analysis described in Chapter 5 and Chapter 6 provide further evidence that is useful for understanding the mechanisms triggering these processes.

Going back to the three-level models presented in Chapter 5, we can summarize some of the findings that provide evidence for the process of spatial heterogeneity in general and for the effects of concentrated poverty in particular. The direct effect of neighborhood socioeconomic status—as opposed to concentrated poverty that includes poverty in the distal context—on educational outcomes tends to disappear when the models include the effects of household and school poverty. This is not surprising since residential segregation, school segregation, and the uneven geography of opportunities mean that household poverty, school poverty, and neighborhood poverty are highly correlated with one another. However, it is worth noticing that, even after controlling for income and socioeconomic status at household and school levels, neighborhood socioeconomic status is significantly and negatively correlated with educational outcomes.

However, when considering indirect and direct effects of neighborhood poverty, the former remain significant whereas the latter finally disappear. Although we cannot be sure that there are no direct effects whatsoever—due to the problem of multicollinearity—indirect effects appear to be stronger. In the lines of Connell's framework (1995), neighborhood characteristics—such as poverty and concentration of poverty—tend to work through the attitudes and behaviors of social mediators. These attitudes and behaviors refer to both the quality of educational opportunities and the cultural patterns molding a number of socialization mechanisms that have strong effects on children's learning process.

In fact, the quantitative analysis suggests that there are three important indirect effects of concentration of poverty on educational outcomes. First of all, the quantitative analysis suggests that living with both parents is more effective for educational outcomes in poor segregated areas than in mixed or wealthy areas. Living with both parents might imply more adult supervision and more collective efficacy for children, factors that have been positively associated with educational outcomes (Sampson et al, 1999; Coleman, 1990).

Secondly, quantitative models suggest that a teacher's job satisfaction predicts higher test scores, but that this positive effect reverses in poor and segregated neighborhoods. This result relates to the idea that, due to the urgency of fulfilling children's' basic needs, motivated and satisfied teachers in deprived areas see themselves as social workers rather than providers of measurable knowledge. By way of contrast, in mixed and affluent areas, teacher job satisfaction actually leads to better results, since teacher duties are directly related to the objective of providing measurable knowledge

The third indirect effect of concentration of poverty on math test scores relates to the evidence that engaging parents in the schooling process of their children is highly effective, and it is more so in poor segregated areas. Therefore, schools that engage parents in school meetings show better educational outcomes; this positive effect more than doubles in poor-segregated areas. Given that the schooling process mimics the behaviors and attitudes of the middle and upper classes (Bourdieu, 1977) and that parents in segregated areas are for the most part isolated from this set of values, school meetings are a true source of learning for both parents and teachers. School meetings give parents the opportunity to learn about the attitudes and behaviors expected in the school, while teachers have the opportunity to learn about how parents see the schooling process. This

learning can be translated into higher test scores. Thus, the school-family bond is more beneficial in poor segregated areas than in mixed areas.

The qualitative collective case study of educational communities in segregated neighborhoods is useful for understanding—among other things—the importance of a strong school-family bond, of living with both parents, and of teacher satisfaction, for predicting higher (or lower) math test scores.

The qualitative analysis of educational communities in poor neighborhoods suggests that one of the main problems that distinguishes segregated from non-segregated neighborhoods is the predominance of deviant behaviors such as delinquency, drug-addiction and alcoholism. One of the more influential factors affecting people's behavior in segregated areas is violence. Violence pervades not only sociability between neighbors but also the relationship between schools and families.

Pervasive deviant behavior has two main consequences for children's learning process. On the one hand, collective efficacy becomes extremely difficult when neighbors and teachers do not trust each other, and are actually afraid of one another. On the other hand, some mothers tend to trivialize deviant behavior. As a consequence, many children are exposed to situations associated with deviant behaviors while unsupervised.

The analysis of atypical cases—those educational communities that do better than expected given the context in which they are located—suggests that the school can play a key role as a source of collective efficacy and adult supervision. However, the analysis also suggests that schools that are an effective source of collective efficacy and adult supervision are, in turn, schools that actively engage parents in children's school life. In doing so, these schools are able to establish a cooperative effort between parents and teachers, which is seldom the case in typical educational communities.

In typical educational communities, lack of cooperation between school and parents suggests that there is a gap between the attitudes and behaviors in the household and the attitudes and behaviors expected in the school. Illustrative of this gap is the analysis of mothers' expectations about the potential returns of schooling. Biased information, lack of mainstream-oriented role models, and probably the lack of first-hand experience on educational and social mobility, means that many mothers are not familiar with the educational path necessary for upward mobility. Thus, mothers tend to focus on the short-term benefits of schooling such as socio-affective care and the transfer of goods such as food and clothes. Long-term benefits of education, in particular social mobility, are hardly an issue in the conversations.

Thus, schools that are an effective source of collective efficacy and adult supervision are the ones that show a close school-family bond that plays a key role in establishing joint collaboration in favor of children's learning process. Nonetheless, typical schools also try to generate a strong school-family bond. The problem is that many of these typical schools—their teachers and principals—adjust their expectations about the benefits they can provide to their students. Given the daily obstacles teachers and principals meet when trying to educate, the school chooses to adopt the mission of creating the basic conditions for learning—which is ordinarily accomplished by the household—as opposed to the mission of enabling the learning process itself.

In summary, the quantitative and qualitative analyses of the spatial processes affecting educational outcomes suggest that neighborhood isolation works through family and school mediators (Connell, 1995). Families in poor and segregated neighborhoods lack exposure to the medium and upper class behaviors and attitudes that are dominant in formal school settings (Bourdieu, 1977). Some schools also adjust their expectations about their students' potential outcomes (Bauder, 2001), which is actually important for

children's performance (Rosenthal and Jacobson, 1992). Isolation from the school's culture and teachers' low expectations are reflected in lower educational outcomes.

7.2 POLICY IMPLICATIONS

This research is able to distinguish significant neighborhood effects on math test scores from household and school effects. In particular, spatial concentration of poverty is proven to be important for educational outcomes. Several important policy implications can be derived from these findings. These policies relate to the following issues: a) facilitating school-choice among families from poor-segregated areas, b) taking into account the role of social mediators, and c) modifying the context itself. I will refer to each of these topics in turn.

7.2.1 School-Choice

One of the reasons why spatial concentration of poverty is important for educational outcomes is because of the poor quality of the educational opportunities in these areas. Given the nature of the school system, these poor quality schools survive because students keep enrolling and bringing funds that keep the school functioning.

A school-choice educational system such as the Chilean voucher system is premised on trust in the behavior of parents as guardians of educational quality. A voucher system in education purposely relies on users' satisfaction to make schools accountable. Hirshmann's (1970) exit and voice mechanisms are examples of how parents should play an active role in providing incentives to schools to provide high quality education. School-choice represents a constant threat of "exit" that, according to the rationale of the system, should increase quality of education. Thus, if school-choice is

restricted for parents in poor-segregated areas, the school system is not receiving the "exit threat" signal that would boost quality of education. In a sense, school-choice does not make a difference for parents from poor-segregated areas. [157]

The reason why these parents have restricted possibilities for choosing schools refers to two main issues: the local availability of educational opportunities and informational asymmetries. Transportation costs are often unaffordable for families in poor-segregated areas. Thus, choosing schools that are far away from home is virtually impossible. Busing—the transporting of students by bus to schools outside their neighborhoods—is a policy that can be implemented to help families to avoid transportation costs when choosing a school that is located outside the neighborhood.

Regardless of the transportation costs, we have seen in this research (see Chapter 6) that many families choose poor quality schools because of lack of information. In poor segregated neighborhoods there is not a lot of information about the relative quality of the school and also about the importance of education for social mobility. Therefore, maybe the most obvious policy implication to boost school-choice is to improve access to information for parents in neighborhoods of concentrated poverty. Information policies—such as league tables—should take into account that these parents have little or no access to internet, which is the main way this information has been publicized so far.

It is important to note that information policies will not be effective unless parents are able to make sense of this information. Education returns are often unknown among parents in areas of concentrated poverty—recall the mother who wanted her son to go to college so he could be a policeman—thus it is likely that, when choosing schools, parents are focusing on short-term benefits of education rather than on quality of education as

[157] School-choice is probably less important for parents from areas of concentrated wealth as well. As was demonstrated in Chapter 4, these areas are overflowing with high-quality schools at the local level.

such. Thus, information policies should also include a reference to the long-term benefits of education in these terms.

It was suggested throughout this research that the fact that many mothers are not able to visualize the importance of good quality education for social mobility is due to the lack of role models in the community. If the structure of opportunities at the local level does not require a sound education, then educational outcomes are less relevant as a goal. Thus, modifying the structure of opportunities—decreasing unemployment, idleness, and deviant behavior—is a way of repositioning education as a means for social mobility. I will return to this topic shortly.

7.2.2 Role of Social Mediators

The results of this research suggest public policies should take into account that, to some degree, poverty at the household and school levels are mediators of the effects of poverty in the broader context. Thus, resource allocation should adopt a systemic approach in the sense that resource productivity may well be lower than expected if it is not accompanied by an intervention of other elements from the educational community. For instance, it has been suggested that the promotion of good schools alone will not lead to higher educational outcomes if parents are not willing—or not able—to work cooperatively along these lines. Therefore, an important policy implication refers to the need for taking into account the role of social mediators such as parents and teachers.

This research has brought attention to the role of parents and other adults in the community as social mediators. It has been demonstrated that living with both parents—as opposed to living with one or neither of them—is positive for educational outcomes, and it is more so in areas of concentrated poverty. In addition to the qualitative analysis, this result highlights the importance of parental involvement in the schooling process.

The question for policy is how to get parents from areas of poor and segregated neighborhoods involved in the schooling process of their sons and daughters. Programs aimed at raising awareness about the importance of parental support and supervision and at providing incentives for parental involvement are an example of how this goal can be reached.

The qualitative analysis suggests a caveat: in order for support and supervision to translate into educational outcomes, parental support and involvement should be in sync with the school's expectations. Thus, schools have the key responsibility of establishing the parameters for joint collaboration between the institution and the parents. In this sense, programs aimed at increasing involvement among members of the community should be established in the school. In doing so, the bond between the school and the community would be reinforced. This is extremely important since the school-family bond has proven to be one of the most important predictors of educational outcomes. Along these lines, the quantitative analysis suggests that school meetings are a good way to involve parents in the happenings of the school. This periodic contact may lead to more collaboration between parents and teachers.

The results of this research highlight the role of the school in compensating the The results of this research highlight the role of the school in compensating for the negative effects of spatial concentration of poverty. Schools that actively reinforce parental involvement have considerably higher test scores than schools that are less effective in doing so. Given the high degree of school segregation, the current discussion about the importance of the school revolves around the difficulties in distinguishing the relative importance of institutional capacities, as opposed to the importance of the social composition of the school. What is it that "makes the difference"? Is it the institutional capacities that make cooperative work possible? Is it the concentration of a number of

characteristics of the parents that make cooperative work possible? I would argue that it is a little bit of each. However, in this research I want to make the point that it is the combination of both institutional capacities and parental involvement that makes the difference. A policy approach should be systemic in the sense that it should take into account the importance of the entire educational community: parents and teachers.

The analysis suggests that attitudes and behaviors of teachers and school principals are key elements that may well be addressed from a policy perspective. In accordance with the findings of the qualitative analysis, the positive effects of the school-family bond show up only when the school does not adjust their expectations for the educational outcomes of their vulnerable students. When parents' and teachers' expectations converge in terms of—in Luhmman's (1996) words—the moral intention of schooling as opposed to its instrumental value, the school-family bond will not necessarily lead to higher test scores. The qualitative research suggests that teachers in these settings need to be qualified for providing for basic needs without abandoning the learning goal.

Therefore, this research raises the issue that teaching children whose learning process is not effectively supported in the community, is radically different from teaching children whose families and communities' behaviors and attitudes are in harmony with the attitudes and behaviors in the school. In this sense, teachers' responsibilities in schools located in poor and segregated areas are significantly more complex since they need to carry out two goals: creating the conditions for learning and enabling the learning process itself. In Chile, a program called the "full-time school day" (Jornada Escolar Completa) implemented in 2006, represents a recognition that vulnerable children need to spend more hours at school for two main reasons: children need to be insulated from the contradicting attitudes and behaviors in their communities, and children need more time

to reach the double goal mentioned above. This research raises the issue that is not merely time what is needed. Children need quality time at school. In this sense, teachers need preparation about the special needs of children accustomed to living in violent and deviant normative contexts, which makes more difficult the learning process.

One of the findings of this research refers to the fact that teacher job satisfaction in schools located in poor and segregated areas is associated with lower test scores. Qualitative analysis highlights the idea that the reason behind this puzzle is that satisfied teachers are the ones that adjust their expectations. Expectation adjustment can be understood as an attempt to diminish "cognitive dissonance"—the uncomfortable feeling when there is discordance between what one holds to be true and what one knows to be true. When trying to decrease "cognitive dissonance" there is a tendency for individuals to seek consistency among their cognitions: beliefs, opinions, and behaviors (Festinger, 1957). In such a case, it is likely that teachers downsize expectations given that there is a disconnect between what they believe are the long-term benefits of education and what they see on a daily basis. Since expectations are likely to play an important role in determining educational outcomes themselves (Rosenthal and Jacobson, 1992), policies should look for alterative ways to diminish teachers' "cognitive dissonance". Possibly, training about the special needs of children living in vulnerable conditions could be a way of diminishing cognitive dissonance without downsizing expectations.

7.2.3 Modifying the context itself

A long-term policy implication that derives from this research refers to the modification of the context. Desegregation of neighborhoods and the generation of social contact between social groups might have a positive impact on the amount and quality of educational opportunities at the local level, and the amount and variety of information

parents receive to make schooling decisions and to raise awareness about the long-term benefits of education. Due to socioeconomic homogeneity and social isolation at the local level, parents are not exposed to complete information about the relative quality of the school and to the importance of current educational outcomes for social mobility. Thus, socioeconomic desegregation of neighborhoods would increase options for school-choice in two ways: a) desegregation would decrease the problem of spatial mismatch, increasing the amount of opportunities at the local level; and b) desegregation would help parents to make informed schooling-decisions.

Another important policy implication derives from the finding that most behaviors described as affecting conditions for learning are somehow related to the high level of violence in the neighborhood. For instance, the qualitative analysis draws attention to the challenges for collective efficacy and for cooperation between parents and teachers that are presented by the lack of trust between members of the community. All of the mothers had some story about drug addicts, alcoholics, delinquents, and any sort of deviant behavior in the neighborhood. The kinds of policy implications that can be drawn from this finding aim at reducing deviant behaviors which may well have some effect on the way people interact in the neighborhood and within the school.

In the short-term, addressing deviant behaviors in the neighborhood can be done through coercive policies such as increasing the presence of the police. In contrast, long-term policies should try to modify the structure of local opportunities. It is likely that delinquency and drug addiction spread as a response to a lack of mainstream-oriented opportunities yielding equal or higher returns. Thus, decreasing adult and youth unemployment may well be an effective way to generate mainstream-oriented role models. These types of role models would help children to visualize their own success in

the future and to value current education as a means to gain access to the relevant structure of opportunities.

7.3 FURTHER RESEARCH

Maybe one of the most important contributions of this research is that it opens up a number of questions and issues that provide a rich research agenda for the future. I would like to mention two ways in which this research could offer a better understanding of the effects of concentration of poverty on educational outcomes.

The results of the qualitative analysis suggest that we need to understand why strategies to cope with contextual adversities vary from one individual to another. In fact, the qualitative analysis suggests that the effects of concentrated poverty on educational outcomes are far from deterministic. The evidence that neighborhood effects act through the behavior of social mediators urges us to consider that the characteristics of these mediators should be taken into account. On the one hand, this research was able to visualize the effect of the school on counterbalancing these effects; however it was less effective in pinpointing the individual and household characteristics explaining why some mothers exhibit behavior that is more beneficial to their children's learning process. To the best of my knowledge the literature has not adequately addressed this point. From sociology, the work of Ruben Kaztman (1999) and of Kaztman and Wormald (2002) provides a platform that helps us to connect the neighborhood characteristics with the household assets. This framework called "Vulnerability, Assets and the Structure of Opportunities" is a good starting point to include individual and household assets and the way these help families counterbalance—or exaggerate—the negative effects of the neighborhood. From psychology, the concept of resilience or the "dynamic process encompassing positive adaptation within the context of significance adversity" (Luthar et

al, 2000) is also a good starting point for understanding the differences in the strategies to cope with contextual adversities. Connecting these concepts to the theory of neighborhood effects, the theory of the geography of opportunities, and the theory of spatial mismatch, would provide a more comprehensive vision of the effects of concentrated poverty on educational outcomes in particular, and on child development in general.

The second question that can be derived from this study has to do with the limitations of the data. In fact, one can hypothesize that the social mediators' behaviors—that more or less counterbalance the negative effects of contextual poverty—are in turn affected by previous life experiences. As suggested by Howell-Moroney (2005), one of these experiences might be residential segregation in previous periods. This research is based on cross sectional data and cannot visualize the dynamics of the neighborhood effects. However, I would argue that a longitudinal analysis in tune with a life cycle perspective that takes into account residential histories and major turning points in life, would give a better account of the reasons why some people adopt certain behaviors and other people do not. This is exactly what Hiss (1991) meant by saying "the places where we spend our time affect the people we are and *can become*" (Hiss, 1991, xi).

Appendices

APPENDIX 1: INTERVIEWS

A.1.1 Entrevista Formato Madres

A.1.1.1 Segregación Residencial

Identidad

1. ¿Hace cuánto tiempo vive en este barrio?
2. ¿Cómo se llama su Barrio?, ¿Entre qué calles se encuentra?
3. ¿En qué se diferencia su barrio de los barrios vecinos? (Espacial estructural (calles, casas, plazas, etc.), Calificación de las personas, Actividades que realizan (relacional).
4. ¿Se relaciona con personas que no son del barrio? ¿Se identifica con ellos? ¿Qué tipo de relación es?
5. ¿Cómo cree usted que es visto el barrio por personas externas, es decir, gente que no vive cerca? (Ej: de otras comunas, del centro, etc.)
6. ¿Existen lugares donde usted se sienta segura y cómoda en el barrio? ¿Cuáles son? ¿Existen lugares donde usted NO se sienta segura o incómoda en el barrio? ¿Cuáles son?
7. Ahora le voy a pedir que haga un pequeño dibujo de su barrio y que pinte de rojo las áreas que considera más peligrosas, y de azul las áreas que considera familiares, seguras.
8. ¿Cuáles considera usted que son los problemas más importantes del barrio?
9. Si tuviera que clasificar a su barrio entre: Bueno-regular-malo ¿Cuál escogería? ¿Cuáles son las razones?
10. Si le ofrecieran una casa con similares condiciones a la suya, pero en el barrio vecino ¿Se cambiaría? ¿Cuáles son las razones?

Oportunidades

11. ¿Existen oportunidades para realizar actividades extra-programáticas en su barrio? (Centros deportivos, centro de madres, etc.)
12. ¿Considera que en el barrio se puede acceder a una buena educación básica?
13. ¿Cómo cree que son estas oportunidades con respecto a otros barrios? (barrios vecinos o más lejanos)
14. ¿En general, cuál es la situación laboral de sus vecinos? (cesante, trabajo formal, informal y/o tipo de actividad. ver regularidad del trabajo)
15. Su esposo, pareja o usted, ¿han conseguido trabajo gracias a los vecinos?

Aislamiento

16. ¿Debe salir de su barrio para hacer las compras, pagar cuentas, hacer trámites, etc.?¿A dónde tiene que ir usualmente?

17. ¿Cuánto tiempo tarda en ir a estos lugares (y al centro)? ¿Es fácil llegar?
18. ¿Ha tenido que rechazar algún trabajo debido a la lejanía?
19. ¿Considera que su barrio está alejado del centro de la ciudad? ¿Es relevante esto para Usted?

Estigma

20. ¿Ha sentido alguna vez que lo han tratado diferente por provenir de esta zona (o barrio), es decir, sentir algo extraño, cierta diferencia?
21. ¿Ha tenido que ocultar su domicilio alguna vez para acceder más fácilmente a algún trabajo? ¿Evita decir en primera instancia de que zona-barrio proviene?

A.1.1.2 Mecanismos

Efecto Pares

22. ¿Conoce al grupo de amigos con que se junta su hijo? (colegio y/o barrio)
23. ¿Como considera usted a este grupo: bueno-regular-malo? ¿Por qué?
24. ¿Siempre es el mismo grupo? ¿Varía mucho?
25. ¿Los amigos de la escuela conocen a algunos amigos del barrio? ¿Son los mismos?
26. ¿Usted considera que existen "líderes en los grupos de amigos de su hijo? Como son?
27. A su juicio ¿Cuál es su mejor amigo? (caracterice)
28. Si usted pudiera elegir o describir el "Amigo Ideal" ¿Cómo sería aquél niño?
29. Ahora ¿Cómo son realmente los amigos de su hijo? (en comparación con el ideal)

Socialización colectiva

Modelos de Rol

30. ¿Quién considera usted que es la principal persona de la familia o del barrio que influencia a su hijo?
31. ¿Qué características posee? ¿Cuáles son las principales características que imita de él o ella?
32. ¿Existe algún familiar o vecino quien su hijo admire? (características)
33. ¿Existe algún referente? (Ej: tío ingeniero)

Uso de Espacios Públicos

34. ¿Utilizan los vecinos los lugares públicos? (plazas, canchas, etc.)
35. ¿Qué lugar frecuenta usted y su familia?
36. ¿Qué lugares frecuenta su hijo?

Cercanía Intergeneracional

37. En lo referente a sus vecinos ¿Usted cree que son buenos referentes para los niños del barrio y para su hijo? ¿Cree que educan bien a sus hijos?
38. ¿Conoce a los padres de los amigos de sus hijos? ¿Cuál es su relación con ellos?
39. ¿Existe algún vecino al que los niños (y/o su hijo) "le tengan buena" (admiración)
40. ¿Cómo es este vecino?

41. ¿Cómo es la relación con su hijo? ¿Es influenciado su hijo por él? ¿Cuánto tiempo pasa con él?

Capital Social y Eficacia Colectiva

42. ¿Tiene vecinos a los que le tiene más confianza? (caracterice)
43. ¿Cómo se llevan sus hijos con estos vecinos más cercanos? ¿Cuál es su apreciación? (respeto, obediencia, etc.)
44. ¿Se realizan muchos favores entre los vecinos?
45. ¿Cómo considera ésta actividad en general?
46. ¿Cuando los niños hacen "maldades" en la calle, los vecinos: los retan públicamente, los acusan internamente con los padres o más bien no hacen nada? ¿Qué haría usted?
47. ¿Existen adultos a quienes los niños respetan más en el barrio a la hora de supervisarlos o reprenderlos, es decir, que tiene mayor eficacia en ésta tarea?

Socialización Institucional

48. ¿Por qué eligió este colegio?
49. En general ¿Cómo es el comportamiento de los alumnos del curso?
50. ¿Qué espera que el colegio le entregue a su hijo?
51. Si hubiera un colegio mejor, pero un tanto alejado de su barrio ¿Cambiaría su hijo?
52. ¿Conoce al profesor jefe de su hijo? (caracterice).
53. ¿Cómo es la relación de los alumnos con el profesor? ¿Y la de su hijo?

A.1.2 Entrevista Formato Profesores y Directivos

A.1.2.1 Segregación Residencial

Identidad

1. ¿Cuál es el nombre del barrio en el cual está ubicado el colegio?
2. ¿Entre que calles se encuentra este barrio?
3. ¿Hace cuanto tiempo frecuenta este barrio?
4. De acuerdo a su percepción. ¿En que se diferencia el barrio en el cual está ubicado el colegio con los barrios vecinos (o del resto de la ciudad)?
5. ¿Cuál cree que es la percepción del resto de la ciudad (gente externa que no pertenece al barrio) acerca del barrio de la escuela?
6. ¿Cuáles cree, a su juicio, son los principales problemas de éste barrio?

Oportunidades

7. ¿Cuáles son las oportunidades extra programáticas a las cuales pueden acudir los niños en la escuela?
8. ¿Existen diferencia con otras escuelas de barrios contiguos? ¿Y del resto de la ciudad?

9. De acuerdo a lo que usted ha podido observar desde su posición de directivo ¿Cuáles son las oportunidades extra programáticas a las cuales pueden acudir los niños fuera de la escuela?
10. ¿Cuáles son las oportunidades extra programáticas a las cuales pueden acudir los niños fuera de la escuela en barrios vecinos? ¿Y en el resto de la ciudad?
11. ¿Cuáles son las oportunidades de acceder a una buena educación en este barrio?
12. ¿Cuáles son las oportunidades de acceder a una buena educación en barrios vecinos? ¿Y en el resto de la ciudad?

Aislamiento

13. De acuerdo al contexto en el cual usted se desarrolla laboralmente ¿El barrio en el cual usted desarrolla su actividad de directivo, es un barrio lejano respecto de los centros importantes de la ciudad?

Estigma

14. ¿Cómo caracterizaría a los habitantes de los pobladores que habitan el barrio donde se ubica el colegio?
15. ¿Considera usted que la gente que habita este barrio es tratada de un modo diferente por su lugar de asentamiento?
16. ¿El barrio en el cual está emplazado el colegio tiene alguna connotación especial para el resto de la sociedad?
17. Según su percepción ¿Considera que el barrio en el cual está emplazado el colegio es un barrio bueno, regular o malo? ¿Cuáles son las razones de su percepción?
18. ¿Tiene intenciones de cambiar de barrio para ejercer su actividad de directivo?

A.1.2.2 Resultados educacionales

19. ¿Cómo son los resultados educativos que ha obtenido el colegio (piense en el Simce)?
20. ¿Cree usted que el contexto que ofrece el barrio explica de algún modo esos resultados?
21. En relación a los resultados de los colegios de barrios contiguos y del resto de la ciudad ¿Cómo son los resultados del colegio donde usted trabaja?
22. De acuerdo al tipo de alumnos que asisten al colegio donde usted ejerce
23. ¿Existen diferencias con los alumnos que asisten a colegios de barrios vecinos o de colegios del resto de la ciudad?
24. De acuerdo al tipo de directivos que trabajan en el colegio donde usted ejerce ¿Existen diferencias con los directivos que ejercen en colegios de barrios contiguos o de colegios del resto de la ciudad?
25. De acuerdo a la infraestructura del colegio donde usted ejerce ¿Existen diferencias con la infraestructura de colegios de barrios contiguos o de colegios del resto de la ciudad? ¿Qué falta?
26. A su criterio ¿Qué es lo positivo y negativo del colegio donde usted trabaja?
27. ¿Es frecuente el cambio de alumnos de este establecimiento a otro en un barrio distinto?
28. ¿Cómo se articula la enseñanza en el colegio con respecto a otros colegios?

29. ¿Existe alguna suerte de competencia planificada a nivel de distrito que les permitan acceder a ciertos beneficios?

A.1.2.3 Mecanismos

Socialización Institucional

30. ¿Usted siente que su trabajo como directivo tiene efectividad sobre sus alumnos?
31. ¿Usted siente que su trabajo como directivo es efectivo según los parámetros oficiales-formales de evaluación?
32. ¿Usted cree que el tipo de trabajo que realiza se corresponde con el salario que recibe? ¿Cuáles son las razones?
33. ¿Usted cree que la dependencia del colegio donde ejerce es objeto de estigmatizaciones? ¿Qué le pasa a usted con lo anterior?
34. ¿Qué lo motiva del colegio donde se desempeña para venir a trabajar?
35. De acuerdo al contexto barrial en el cual está emplazado el colegio donde se desempeña ¿Cuál siente que es su principal misión como directivo?
36. ¿Valora más las aptitudes intelectuales, o bien, el esfuerzo y esmero en el desarrollo escolar de los alumnos? ¿Cuáles son las razones?
37. ¿Podría definirnos, de acuerdo a sus aspiraciones como directivo, cual sería el alumno ideal?
38. ¿Cual es el alumno real?
39. Desde el primer día que llegó a este establecimiento ¿Cómo ha variado su conducta como directivo? ¿Y la concepción de la labor directivo?
40. ¿Cuáles son las carencias que viene a satisfacer su labor directiva en este contexto barrial?
41. De acuerdo a su juicio y de acuerdo a la información que usted a recabado en su contacto con los apoderados ¿Qué esperan los padres del colegio?
42. ¿En que se diferencian esas expectativas de acuerdo con lo que usted cree pueden ser?
43. ¿Las expectativas de los padres han cambiado su manera de proceder con los alumnos?
44. ¿Podría hablarnos de cómo es su relación con los alumnos (relación pedagógica-directiva)?

A.1.3 Sample of Transcript (in spanish)

Entrevistada: Mamá, Villa el Castillo, colegio típico/ instrumental

Identidad

Háble me del lugar donde vive, lo que usted considera su barrio
- A ver, yo vivo en la Población Eleuterio Ramírez. La calle donde vivo yo es Teniente Moreno. Las calles principales: Bartolomeo Iday y Batallón Maipú. Bueno, mi barrio, donde yo vivo, mi sector es tranquilo, eh digamos, siempre se imagina que es malo, que el Castillo es malo, que aquí que los cogoteros, todo eso, pero el sector donde vivo yo es como bien tranquilo porque hay gente adulta ya. O sea, todos los que llegaron ahí son adultos y entonces quedamos nosotros los hijos de ellos (…) somos los jóvenes que hay ahí, entonces los chiquillos son como tranquilos los que de mis vecinos. Todos ya tenimos hijos todos casados ya, con hijos. Es tranquilo

¿Hace cuánto tiempo vive ahí?
- Mas de 20 años. A ver, qué más le puedo decir (…) eh como en todas partes si po eh hay lados que hay jóvenes que se juntan como pandilla en la esquina, ahí se ve la drogadicción si. Casi todos los jóvenes están metidos en ese vicio, eh delinque. Pero los que están cercanos a mí, o sea, que yo me crié con ellos desde chica, ahora hemos salido tranquilo casi todos los que nos juntábamos cuando éramos chicos. Pero hay también otros jóvenes que eran menor que yo, ya están grandes digamos de porte así, a la edad de los 15 años ya están metidos en la droga
Más allá de esta definición espacial que me ha dado ¿Cuál siente usted que es su barrio?
- Ese po, adonde vivo yo, con los vecinos.
Dibújeme usted donde está su barrio
- Pongámosle que este es el pasaje donde yo vivo, se llama teniente Moreno (…) aquí está, estas son las calles principales que están como al costado Bartolomé Iday y Batallón Maipú. Por acá sigue otra avenida que está como así, esta como es que se llama (…) esta de allá, donde pasan las micros (…) ay, no se como decirle, no se cómo se llama, pero es la avenida donde pasa la locomoción. De ahí seguimos para acá, con calle Elombu (…) y aquí llego al colegio yo, más o menos por aquí está el colegio. Yo tengo que caminar todo eso así en todo caso, es largo. Esta es la otra población. Está aquí Santa Rosa, aquí empieza la población. Todo esto es Elombú, pero es que yo tomé de aquí, de donde pasa la micro derecho pa acá, llega a Elombú aquí, y todo esto es Elombú. Yo no tomé en cuenta Santa Rosa. Supongamos, todo esto es Santa Rosa ¿ve? Y aquí empieza Elombú, esta calle, toda esta calle ahí toma pa acá Elombú ¿ve? Llegando a Juanita aquí, que Juanita está aquí. Es que para al lado, eh yo no tomé en cuenta tampoco la población de acá al lado, como se llama esa población, la villa Lautaro, no se cómo se llama. Después viene el Castillo, que sigue así, de Santa Rosa, acá está todo el Castillo pa adentro y al lado de esa está el Eusebio Ramírez, ese es mi barrio, Eusebio Ramírez, está al ladito, al

ladito del Castillo, pero como (…) siempre toman todo del Castillo, ah dicen 'yo vivo en el Castillo'

Su barrio ¿En qué se diferencia de otros barrios?
- A ver, pero de otras comunas dice ud. o puede ser de acá mismo? No se, porque yo cuando he salido a otras comunas, encuentro las otras comunas más bonitas que esta. Digamos en el sentido no tanto de las áreas verdes, porque este es bonito aquí La Pintana, es como bien campestre, pero en el orden de la gente, es como media sucia así, botan basura, no están ni ahí. Encuentro que esa es la diferencia que hay en otras comunas, porque acá se ve mucho que la gente, por ejemplo, eh ha limpiado no se cuantas veces atrás, al terminar la población, y vuelve la gente a botar los cachureos, bota basura y se ve feo po. Pero sí donde vivo yo, alrededor hay una multicancha, y frente a esa multicancha hay una plaza, bien bonito si, eso si, bueno que los cabros, por el columpio, a la semana ya no hay. Pero se mantiene el pastito, los arbolitos, porque hay un caballero que viene y los cuida

¿Y las actividades que realizan en el barrio son distintas a las actividades que realizan en otros barrios?
- Es que yo soy de, como bien dueña de casa, no salgo (…) cuando voy donde mis tías, pero a lo lejos (énfasis) que salga yo, no sabría decirle en otras comunas, pero si juegan campeonatos frente a mi casa, los mismos de siempre po, los que vivimos ahí

¿Ud. se relaciona con personas que no sean del barrio?
- Mm, no (…) a si po, tengo amigas pero no voy mucho, no salgo mucho. Tengo amigas que viven (…) tengo una que vive en el 30, otra en Quinta Normal, La Florida (…)
- Eh no, soy como bien (…)

¿Y como lo ven el barrio por ejemplo, por la tele?
- Ah no, siempre dice 'La Pintana, el Castillo que son malos' que aquí hay puros delincuentes, siempre la marginan. Siempre está La Pintana, La Legua, las poblaciones como las más malas. Y en realidad a veces pagamos justos por pecadores

¿Existen lugares donde usted se sienta segura y cómoda en el barrio?
- La iglesia
¿Dónde está la iglesia?
- A ver, Moreno (…) sí, en el mismo pasaje, en la esquinita aquí está la iglesia. Es el unico lugar que yo voy, van mis hijos, mi hijo y mi sobrino, que tengo un sobrino que lo crié de como (…)

¿En que otro lugar se siente cómoda, segura?
- En mi casa, en mi casa

Aislamiento

¿Ud. debe salir de su barrio para hacer compras, pagar cuentas, hacer trámites?
- No. O sea, para pagar cuentas comerciales que ahora tengo si, tengo que salir al centro de Santiago. Voy a la Alameda, porque ahí tengo (…) y ahí no más po. Y la luz la pago aquí en la comuna, o el agua, el teléfono
¿Cuánto tiempo tarda en ir a estos lugares, al centro por ejemplo?
- Al centro son, digamos, una hora para allá y digamos me quedo vitrineando, unas 3 horas, 4 horas. En ir una hora y en volver otra hora, 2 horas.
Su marido o ud. ¿Ha tenido que rechazar algún trabajo por la lejanía?
- Si, pa'l norte, en Antofagasta creo que era
No se podían ir
- No, porque el Marco sufre de mucha migraña, como jaqueca también, entonces pa allá le da, le hacía mal la altura
¿Y aquí en Santiago?
- No, no hemos tenido (…)
¿Considera que su barrio está alejado del centro de la ciudad?
- Si. Si porque es lejos
¿Esto cómo le afecta a usted?
- No, igual a mí me gusta salir, me da igual gastar una hora pa allá, una hora pa acá. Eso si que cuando se hace tarde, uno no tiene locomoción para volver entonces ahí uno se empieza a preocupar. Si hay micros, lo que pasa es que, como le dijera, eh venir apretá, viene mucha gente y todo eso (…) venir lleno

Estigma

¿A su barrio o esta zona lo llaman de alguna manera particular, un nombre distintivo?
- No, le dicen Eleuterio no más. Porque pa allá yo he escuchado que dicen el pueblo sin ley (…) el que entre pa dentro (…) salí calao y toda la cuestión (risas) como la sandia que salí calao así. Es como que lo más malo pa allá po. No, y es verdad, sabe que yo una vez tuve un primo que nosotros lo apoyamos porque estaba en la drogadicción, se vino de Renca este cabro, y yo lo interné todo por acá en San Rafael en una esta de acogida y estuvo bien po, estuvo bien, no teníamos (…) y entró a trabajar porque es camionero este cabro, sabe que es de buena situación, perdió auto, todo por la droga. Ya po y encontró trabajo de camionero y todo eso pero en una de estas (…) tengo un tío yo que vive cerca mío, entonces ese tío va a Chillan y trae longanizas y vende, hace su negocito (…) y ahí nosotros supimos que este joven había vuelto, eh había vuelto a la droga porque le robó todas las longanizas y se las salió a vender (…) angustiado, claro. Y mi tío dijo 'el Ariel tiene que haber sido' porque nosotros tuvimos un problema con el Ariel entonces mi papi lo, le dijo que él no soportaba esas cosas porque ni sus hijos hacían eso, menos él, entonces se fue pa donde mi tío y mi tío es solo, entonces el Ariel fue el único que le robó las longanizas y lo cachamos. Y aparte que llegaron carabineros a mi casa a decirme de que si vivía, a verificar domicilio si vivía el Ariel y todo, porque estaba detenido por

droga, que lo habían pillado con droga (…) y que tenía que ir yo pa (…) lo pillaron drogándose solo, porque se droga solo, no anda con grupo, solitario. Así que tuve que ir a la comisaría y esta comisaría queda pa allá, pa'l pueblo sin ley, y fui en la noche, fui como a las, o sea, ya se estaba haciendo de noche, eran como las 8. fui con una amiga a verlo po, y sabe que es como ir a la Estación Central así, no ve que ud. va a comprar y le ofrecen la ropa así, pero aquí pero aquí es distinto, le ofrecen la droga 'oye, andai buscando (…) aquí hay, ya tanto'. Todos salen así a ofrecerle los cabros. Y eso encuentro oh lo último marginal así. Y las señoras así pa allá así igual (…) es como que está la escoria pa ese lado así, bien feo pa allá. O sea, pa mí, como soy criá yo, eh es lo último.

¿Ha sabido alguna vez de algún vecino o conocido que lo han tratado diferente por provenir de esta zona?
- Eh sipo. De repente mi mismo marido cuando iba a entrevista de trabajo decía que era de La Pintana 'no, te vamos a llamar', te llamamos, si, y casi todos es lo mismo, toda la gente así (…) las casas comerciales ud. le dice soy de tal comuna 'ah, no'. Yo fui a una casa comercial a inscribirme, que me gustaba esa casa comercial 'y de adonde soy tu?' de La Pintana 'ah, noo (…) mira, no es que no te quiera inscribir' me dijo la niña así, mira, nos mostró el libro, salía toda La Pintana, las calle Eleuterio, Elombú (…) Los Morros, así distintas, estas partes (…) no, a esa gente no le dan (…) tenían sectorizado las calles, las poblaciones que no accedían al crédito

¿Qué casa comercial es esa?
- XXX. Ella me mostró como una carpeta así como con un planito así, salían las calles 'La Pintana' me dijo 'de donde soy tu?' de Eleuterio 'ah, viví al lado del Castillo, noo, no damos pa esa gente'. Entonces es como bien (…) te marginan, es verdad, te marginan así. Así que ahí (…) ahora me dieron porque (risas) di la dirección de un familiar po, pero no dan si uno es de por aca

Si tuviera que clasificar a su barrio entre bueno, regular y malo ¿Cuál escogería?
- El mío bueno. Pa allá es malo, pa allá pa la población pueblo sin ley, pa'l fondo
¿Y acá Elombú?
- Elombú es más o menos no más po. Es que sabe que (…) no es que yo me crea la más bacán y todo eso, no, es que esta población es como bien tranquila. Claro que cuando nosotros recién llegamos era, era malo po (énfasis), entonces pasaron los años y como que ya todos estamos conocidos. Bueno, yo no se como serán los cabros, la gente con los demás porque uno ya tantos años viviendo ahí ya los conocimos. Por lo menos de vista uno 'ah, este es de acá (…)' y no se como serán con otras personas pero (…) como le digo, vivimos tantos años ahí que ya los conocimos de vista
Si le ofrecieran una casa con similares condiciones a la suya, pero en un barrio vecino, de estos barrios que ud. me comentaba ¿Se cambiaría?
- Si. Eh por tener otra vida, o sea, no se como, no otra vida si no que probar suerte en otro lado po, a ver si nos va más mejor, no se, algo así
¿Se cambiaria entonces?
- Si pero no tan así tampoco po, porque igual he tenido oportunidad y no (…) porque hecho de menos

Socialización colectiva

¿Quién considera usted que es la principal persona de la familia que influencia al Esteban? Ud. me ha hablado de David ¿es él el principal de la familia que lo influencia?
- Yo creo que si porque el Esteban ve todo lo que hace el David po, o sea, como que lo imita. El Esteban dice que no pero yo creo que si porque piensan igual, hacen lo mismo, son bien unidos si po 'oye, tengo un partido, ven' 'hay que pagar cien pesos, yo te pago'
¿Y cuanto tiempo pasa con David?
- Todo el día po y toda la noche (risas) si vive ahí. Bueno, que en el colegio no comparten, aquí en el recreo ni se pescan, porque el David tiene su grupo y el Esteban tiene su grupo, así que no (…)
Y el Esteban como que copia estas modas que tiene el (…)
- La onda si, la onda de él. Incluso diría yo hasta en los estudios porque el David también es primer lugar de kinder, ahora va en quinto, siempre ha sacado el primer lugar. Si, los dos
Entonces, absolutamente todo cree que imita de él
- Creo que si. Si porque que como le digo yo, los estudios, igual po, porque andan como que fueran hermanos así. Yo le digo, cuando pelean yo le digo 'uds. no peleen' les digo yo 'porque son como hermanos' porque el David es más grosero con él si, el David 'que guacho cu (…)' y lo trata mal al otro y es más agresivo. Igual de repente le collerea pero siempre el David es como el más fuerte, claro, porque es mayor po, por un año
¿Existe algún familiar, ya más grande, que su hijo admire?
- el Esteban admira a mi hermano, al Wilson. El Wilson siempre ha sido tranquilo, así como bien educadito. Es que pa'l dibujo, dibuja bonito, entonces el Esteban siempre dice 'ah, yo quiero ser como mi tio Willy' y aparte que es bueno pa la pelota, el Wilson siempre ha sido bueno pa'l fútbol, entonces el Esteban siempre dice 'ah, mi tío Willy'
¿Y él que actividad realiza?
- ¿Mi hermano? ¿Cómo en qué trabaja dice usted? En un laboratorio
Entonces como que todo lo ayuda a su hijo a tenerlo como un referente
- Pero en ese aspecto sí porque igual el Wilson tiene caídas po, igual le gusta el (…) eso no le gusta al Esteban si po, o sea, mira, admira mucho, el Esteban puede admirar a mi hermano por el fútbol, por su trabajo, porque igual tiene un buen trabajo, lo imita en ese sentido y a su papá po, porque el Esteban a su papá le halla todo bueno (…) no sé, a ellos dos yo creo
¿Y las caídas que tiene, cuales eran?
- ¿Mi hermano? Es bueno pa'l (…) pa'l trago, se ha puesto últimamente
Y a su papá le encuentra todo bueno
- Al Marcos si porque el Marcos no toma, fuma no más po, y el Marcos del trabajo a la casa, de la casa al trabajo. Y al Esteban, el Marcos no se toma una cerveza digamos el fin de semana dice no, porque esta plata que yo gasto en esto le puedo comprar (…) a mi hijo. Es como responsable, súper responsable mi marido, más que mi hermano si ah, porque mi hermano (risas) el Wilson no po, el Wilson, en ese sentido tengo esa angustia porque el Wilson es más dejao con su hijo. Igual le compra sus cosas pero no es como el Marcos ¿me entiende? Y el David, el David es apegado a mí por lo mismo, porque el David ve que el Esteban tiene todo ¿entiende? y el David quiere lo mismo, entonces

como el Wilson no se lo da, se lo doy yo ¿me entiende? entonces como yo soy la mamá de él, más que la mamá porque la mamá también es bien despreocupá
¿Hasta qué curso llegó usted y su esposo?
- Hasta segundo medio los dos
¿Y cómo se portaban en el colegio?
- Yo era desordená (risas) así porra. Si, era cuatrera
¿Y su esposo?
- Él dice también. O sea, no era desordenado, es más por lo que me cuenta él de que son muchos hermanos, eran 6 parece, 5, entonces el papá era feriano y no le daba al Marcos, porque no alcanzaba po, o le alcanzaba y no se lo daba, entonces el Marcos no pudo más estudiar por lo mismo
¿Y ud. le cuentan a su hijo?
- Si le cuento. Yo le digo, Esteban sabi que yo era terrible de cigarrera, en serio, yo llegaba a la casa con puras mentiras 'papá, me tocó octava hora' cuando iba a existir la octava hora, la séptima hora si po (…) nunca existía la octava hora, entera cigarrera, porra! Por eso yo digo uno no sabe aprovechar lo que sus padres le dan
¿Qué es lo más importante que le entregó el colegio a ud.?
- Yo tengo un lindo recuerdo de la básica, más que de la media, porque no estuve casi na en la media, más en la básica, lindos recuerdos. La profesora todavía la quiero, es de aquí mismo de la comuna po
¿Dónde estudió usted?
- En el Forjadores del Futuro
Ese está en Miguel Ángel
- Si, está allá
¿Y lo negativo, algún aspecto negativo del colegio, que le haya marcado?
- Na, porque después llegaron otras poblaciones y se puso malo el sector po. Empezaron a llegar poblaciones pa atrás y los cabros allá (…) y ahí quedó la escoba. Con decirle que después le decían lo cogoteros del futuro (risas) si po, mala (risas)
¿Usted lee a menudo?
- Leo la Biblia la leo porque estoy, me gusta saber las cosas de Dios, qué hizo
¿Ud. es de alguna religión?
- Si po, estoy recién yendo si po, tengo mis vicios igual po, fumo pero ahora de a poco se me va a ir po, pero voy si a la iglesia. Evangélica.
¿Cuántas horas a la semana lee la Biblia?
- Cuando mi marido trabaja de noche y no puedo dormir, pesco la Biblia y la leo porque me siento sola, me falta él po, entonces (risas) me pongo a leer la Biblia, no le diría cuanto porque de repente la estoy leyendo pum (…)
Se queda dormida al tiro
- Ni se po
¿Qué espera de su hijo?
- que le vaya bien en la vida no más. No se po, me gustaría que fuera profesional, que fuera más que nosotros, que él tuviera armas cuando sea grande para defenderse. Eso Ud. me dijo que tenia un referente, que era como el tío Willy ¿a ud. igual le gustaría que fuera como el tío Willy?
- Eh, en las oportunidades que se le han dado a mi hermano, sí.

¿Y existe algún otro referente?
- Otra persona, excepto mi esposo po, un tío que tengo yo, es bueno ese hombre. Él ahora no trabaja, es jubilado pero fue profesor, es un hombre educado, claro. Sinceramente, me gustaría que mi hijo sacara eso de mi tío, cómo es él. Siempre que yo lo he necesitado mi tío ha estado ahí, es una persona tan buena. Yo creo que él cuando se muera se va a ir con Dios, es de esas personas (…) pongamos, tengo un problema 'sabe tío, estoy mal' 'toma Yuyita' jamás me ha cobrado, jamás (…). Es una persona súper bueno ese hombre

Hablemos de nuevo un poquito de su barrio ¿Cuáles son los lugares que usted frecuenta con su familia?
- En el pasaje más que nada po, en el pasaje y todos me conocen
Ahí juegan los niños
- Juegan si
Cuénteme la actividad que se da
- No con todos yo si me relaciono po, o sea, hay gente que yo las conozco de vista no mas 'Viviana, hola'. En el pasaje con todas hablo po (risas)
¿Pero hay harta gente en la calle?
- Si, ¿Cómo hay harta gente en la calle?
No se po, se paran a conversar fuera de la casa, los niños juegan (…)
- Ah, si. Aquí en la multicancha casi todos los sábados hacen partidos en la noche, entonces (…) a ver, aquí al frente de mi casa está justo la multicancha que es grande, entonces aquí alrededor hay arbolitos, banquitos y vienen todas las cabras a ver los partidos, con los cabros, entonces ahí ya todos conocidos po 'Hola, Viviana (…) hola, Viviana' eso sí, que yo no comparto fútbol, yo no (…) hay mujeres que juegan fútbol ahí, pero yo no juego con esas niñas, pero las conozco ¿entiende?. Yo no juego, tengo que ver el partido obligá porque viven al frente, frente mío así que ahí lo tengo que ver.
Y ud. frecuenta mucho este lugar con su hijo
- Si po, si vivo aquí mismo. Entonces aquí están todos los amigos, vienen a jugar en las tarde (…) y yo salgo, está mi amiga, la Jacqueline 'hola Jaqui, como estay (…)', la Marisol
¿Y cuales son los lugares que frecuenta Esteban?
- Pa este pasaje, (no se entiende) que es la avenida principal. Ahí también tiene amigos y juega, va pa allá, juega en la esquina fútbol. O si no, los trae a todos los que viven ahí pa la multi, juegan en la multi, así.

En lo referente a sus vecinos ¿Usted cree que son buenos referentes para los niños del barrio?
- Si porque son todas personas adultas, súper tranquilas
¿Ud. cree que educan bien a sus hijos?
- Si, si casi todos son adultos, abuelitos po. Si, por ejemplo, mi mamá y mi papá son (…) mi mami tiene 70 años ya po, mi papi igual, la vecina de al lado también, no se mete con nadie, él llega en la noche y se acuesta tempranito, como bien así de gente adulta. Si los cabros son los hijos que están casados y viven por ahí po, por ejemplo, yo, mi hermano que vive ahí con su señora, mi amiga que vive con su marido que son jóvenes, pero son pura gente de trabajo y tranquila po

¿Ud. conoce a los padres de los amigos de su hijo?
- A todos, si po, a todos. Los del colegio, de vista no más los apoderados pero de la casa, a todos po, si vivimos ahí, como le digo. Inclusive del Dante (…) conozco al papá (…) súper bien, súper bien con ellos, conocido si
¿Y ellos no se complican tampoco en tener una relación con ud.?
- No, incluso la señora, me dice 'oye, tu que querí al Ignacio, que querí al guatón' me dice
¿No hablan de su pega?
- No, ella me ofrece no más las cosas de repente 'oye, querí comprar zapatillas (…)'
¿Existe algún vecino al que los niños le tengan buena?
- Que le tenga buena, buena (…) a Juanito, el marido de mi vecina, la Marisol. Es que Juanito es bien buena onda po, o sea, le va a pedir un Bombin 'oye Juan, presta un bombín' le pasa, es buena persona, si, tiene herramientas 'oye Juan, presta una llave pa arreglar la bici' la pasa, así, es bien (…) Juanito le dicen. Yo creo que él puede ser eh (…)
¿Y Juanito es trabajador (…)?
- Si po, es igual que el Marcos po, si trabajan en la misma empresa. El Juan llevó a mi marido ¿me entiende? como buena persona él
La relación que el niño tiene con Juanito ¿Cómo es?
- No igual es hola y chao no más po
No pasa mucho tiempo con él
- No, pero me ha dicho 'mamá, el Juan es buena onda, siempre que uno le pide algo pasa, en cambio, la esposa no, no pasa'

¿Ud. tiene vecinos a los que le tenga más confianza?
- Confianza, confianza, no po (…) tenga vecinas, igual son mis amigas, todos, pero como que me han traicionado, entonces las tengo ahí no más (risas) ¿me entiende? ud. no sabe de repente 'ah, ella es terrible de cuática' y como que el pelambre. O la miran a ud, no sé, algo así. Entonces yo las cacho que son medias (…) pero ahora las tengo ahí, las saludos, son mis amigas, igual comparto con ellas pero yo mis cosas no se las cuento a ellas ni cuento a terceras personas pa que no, no me metan en el (…)
Pero si tiene vecinos más cercanos que otros ¿no?
- Si, ahora si como (…) tengo dos amigas que con ellas son las que más (…)
¿Cómo es la relación de los niños con esos vecinos más cercanos?
- La Cleo le tiene buena a mi (…). Pero es enojón el Esteban si. Que por ejemplo, viene mi amiga en la noche, porque ella trabaja entonces viene a verme tarde a mí, porque me va a ver 'hola Vivita' y el Esteban dice 'ya viene esta señora, no me deja dormir, se ponen a reír'
¿Y hay vecinos más cercanos así que vigilen a los niños, los vayan a acusar cuando se porten mal (…)?
- Hay señoras que son así medias flaiteras si porque van a acusar por todo si po (…) 'oye, sabi que tu hijo se subió a la pandereta, tiró una piedra a la iglesia' porque está la cancha y la iglesia, entonces (…) si hay. No les tengo mala, pero me molesta porque todo lo que pasa, fue el Esteban o el David, es como que son la piedra del tope ¿me entiende?

¿Con sus vecinos se realizan muchos favores?
- No, no. O sea, igual de repente viene, supongamos, la Jacqueline 'ya, teni que me convidí esto' si, claro (…) 'préstame plata' si (…) así viceversa po
¿Y ud. considera buena esa (…)?
- Es que igual la estoy conociendo de hace poquito
¿Ud. considera buena esa actividad de hacerse favores y todo el cuento, en general?
- Eh, sabe por qué, porque digo yo, puta, si uno está mal puede necesitar de alguien po, el día de mañana uno no sabe, hoy por ti mañana por mi po ¿no cierto? Uno tiene que ser bueno en esta vida, ayudar a la gente que no tiene o viceversa, que la ayuden a uno po

Cuando ud. me ha dicho que a los niños os iban a acusar (…) cuando los niños hacen maldades en la calle, estos vecinos: los retan públicamente, los acusan directamente a ud o más bien no hacen nada?
- No si, primero lo insultan, supongámosle 'ay, tal por cual, te voy a ir a acusar (…)' van a la casa. Yo eh, mire, no es que yo defienda a los chiquillos, yo se que son desordenados, yo se que son traviesos y andan lesiando, y andan tirando la pelota, porque viven tirando la pelota pa la iglesia, la tiran pa la junta de vecinos 'tía, vaya a buscar la pelota, que no nos la quieren entregar', yo sé, yo sé. Pero lo que a mi me molesta es cuando andan 'sabi que, el Esteba y el David' y pueden haber habido un grupo de treinta cabros chicos pero el Esteban y el David no más ¿me entiende? Igual que, una oportunidad vino una niña bien chora 'oye, mira el Esteban y el David, shh, tiraron la pelota pa allá, corten la wea (…)' que ella guarda templo, vive ahí ¿Qué? 'el Esteban y el David tiraron al pelota, quebraron un vidrio (…)' oye, le dije yo, sabí que el Esteban y el David están aquí 'adonde?' oye David, Esteban vengan, se asomaron, 'uy, disculpa, los confundí', soy terrible sapa, le dije yo, sabí que, vírate de aquí, soy terrible sapa, le dije. Entonces eso me molesta po, que acusen sin motivo po, porque imagínese yo soy otra, les pego 'adentro, me tienen aburría (…)' bueno, nunca les pego pero, cuando me enfurecen yo les pego una palmá en el poto a los cabros. Entonces eso me molesta a mí
¿Usted qué hace cuando ve cabros chicos que están haciendo maldades?
- No, los reto po
¿Los acusa?
- No. Siempre se suben a la malla, porque ahí está con malla la multicancha y es bien alta y ahí casi siempre se suben po 'oye chiquillos' le digo 'bájense de ahí que se caen, se matan' les digo al tiro porque es peligroso o déjense de tirar la pelota pa la iglesia, pa donde la tía porque la junta de vecinos, resulta que está el jardín ahí mismo, jardín infantil, entonces les digo no tiren la pelota que la tía no anda a cada rato pasando la pelota y los niños los hace dormir, entonces no molesten les digo yo, no, si les llamo la atención.
¿Y le hacen caso?
- A veces me, de repente ni me pescan si po pero yo les digo
¿Existen adultos que los niños respeten más en el barrio a la hora de retarlos, de supervisarlos?
- Al Raúl, si yo encuentro que al Raúl, el Raúl es de la iglesia donde voy yo y ese joven hizo como un grupito así y lo entrena pa'l fútbol ya ese cabro lo respetan. O a la Joly, no se si ud. la conoce, una niña que le ayuda a la dentista aquí, como la ayudante de ella, esa

niña también va a la iglesia evangélica allá y ella les hace escuela dominical (…) si po, vive ahí, y también la respetan cuando ella les habla, le tienen respeto. La tía Joly, el tío Raúl.

Socialización Institucional

¿Por qué eligió este colegio, Viviana?
- ¿Sabe por qué? Porque mire, yo vivo aquí, o sea, ahora vivo aquí yo po, pero antes yo vivía acá, al lado, una casa pareá esa, aquí viven mis papás, pero yo antes vivía acá, de allegada con mis papás (…) y aquí vivía el profesor Manuel, ¿ubica al profesor Manuel de aquí, Manuel Hernández, de religión? Él vivía acá, era mi vecino, entonces el profe Manuel me tiene caleta de cariño y yo a él. Y cuando el Esteban iba en kinder, iba a pasar a kinder 'oye Vivi, al Esteban yo me lo llevo pa'l colegio' (no se entiende) ya, entonces de ahí que yo vengo aquí, por el Manuel, porque hubiera tenido otra opción, más cerca, el Santa Rita, más cerca el Miguel Ángel, el Forjadores (…) ahí va por el profe Manuel. Pero por él yo traje al niño aquí
Y ud. se ha preocupado de promover el colegio
- Ah si po, igual he traído a los cabros chicos
¿Ud. qué espera que el colegio le entregue a su hijo?
- Una buena educación po, sí, una buena educación, que lo (…) le enseñen bien po, los tiren pa arriba po a todos, que sean todos de bien cuando grande, que salgan de octavo la mayoría
¿Y de la profesora, ud. qué espera?
- Ojala que los saque de octavo nomás, y que no sea así tan severa de repente si porque igual como que le tienen miedo, eso no me gusta de la (…) eh, mire del estudio, cómo enseña, bien, pero hay un problema que yo he notado, nunca me he atrevido yo a decírselo a ella, es que no se si, eh bueno, los niños dicen que los castiga, por ejemplo, llegan atrasados, los para adelante y los tiene ahí, y el Esteba le tiene como miedo porque (…) son veinte pa las ocho en la mañana, que apúrense, que vamoslo 'ay, yo me voy primero' y parte y se viene solo, como corriendo, como que le tuviera miedo, no se por qué. No se lo he dicho a la profesora porque en una oportunidad una apoderada se lo dijo y la profesora como que le agarró mala al alumno. Entonces para que no pase eso con mi hijo, yo no se lo he dicho ¿me entiende?
Si hubiera un colegio mejor, pero más alejado de su barrio ¿Cambiaría a su hijo?
- No, no po, si la profesora le enseña bien como le digo, si el otro tema no más que a mí me ha complicado siempre que noto que, que todos los niños son iguales así po, como que (…) no sé, le tienen miedo no sé por qué, igual dicen que es gritona y 'wa' (ruido de grito) y grita. Eso le cambiaria yo a la profesora.
¿Qué más cosas conoce de la profesora de su hijo?
- Lo malo que uno quiere conversar con ella 'ay, no mamita, estoy ocupá, ahora no la puedo atender'. Y todos los apoderados se han dado cuenta, por ejemplo, que de repente pasa con el curso, cuando se van a la sala, y lo más bien se puede quedar conversando con la profesora Mercedes, media hora po, con los cabros chicos paraos ahí (…) entonces

dicen ‘ah, esta profesora, shh’ a uno no la atiende y pesca a quien quiere pa hablar (…) ¿me entiende?
¿Cómo es la relación de los alumnos con la profe?
- No se si será miedo (…) es que eso yo no comprendo porque digo yo, la profesora le enseña bien, el Esteban ha aprendido caleta con ella, pero está el lado que es el temor que le tienen, y todos, porque no es nada solo el Esteban, yo lo he notado en el Jeremy, lo he notado en el Diego, lo he notado en el B.. Incluso hemos conversado entre las mamás ‘oye, a tu hijo le pasa esto’ ‘(no se entiende) le gusta hacerse la gueona’ no sé, así comentarios
¿Y su hijo tiene ese miedo también?
- Si
¿Y no hay ninguna relación más afectuosa por ser el primero del curso?
- ¿Con él? No
Hace la pega no más
- Si, eso igual encuentro injusto porque mire, en el Santa Rita, los niños primer lugar le dan diplomas, los (…) como se llama eso, como que los premian, una cosa así, aunque sea un diploma escrito el primer lugar o el mejor compañero, aquí no po. Aquí mire, sabe que el Esteban de primero, de kinder se destacó hasta ahora, nunca le han dado un diploma po. Incluso allá mismo el director de lo entrega al alumno a fin de año, o se saca una fotito con él, ¿eh? Es un presente así pa decir lo estay haciendo bien, tira pa arriba, esfuérzate pa que el otro año seai mejor. Aquí no. El David igual. El año pasado le regalaron un regalo si a los dos, pero sabe quien fue? El profesor Manuelito, porque ese profesor, él tiene contacto porque no se quien lo ayuda a él pa fin de año y le dan once pa todos los niños, y el colegio, y les hace su regalito porque son donaciones de otra gente, externa al colegio, no es del colegio. Y el profe Manuel, porque sabe que el Esteban y el David se han destacado siempre, les regaló un camión así de grande el año pasado. Pero jamás ha tenido el Esteban un diploma del mejor alumno, del primer lugar, de no llegar atrasado, que a veces igual po si son niños ¿no cierto? Yo digo no tan solo por los míos, por todos porque es así una manera de incentivar los niños, tirarlos pa arriba po. Eso falta aquí también po, eso
Hablemos de las cosas que usted cree que el niño ha sido influenciado acá en el colegio ¿Qué cosas habla el niño de la profesora?
- Igual ella les dice ‘yo quiero que sean otra cosa, estudien chiquillos, si no porque uds. sean de La Pintana uds. van a ser marginados, si uds. son iguales que los niños de La Florida, de Las Condes, de Vitacura, de Huechuraba’ si ella les dice eso si, nada que decir, yo la he escuchado yo misma
¿Y al Esteban le gusta escuchar eso?
- Si po, si a las finales a los mejor uno sabe más que esos cabros, dice, si me ha dicho
Eso lo aprende directamente de su relación con la profe
- Creo que si po, porque ella les dirá si, yo la he escuchado si. Incluso ella misma cuando hay reunión de apoderado nos dice a nosotros ‘no po mamás, no porque sean de La Pintana son malas mamás, no, al contrario, uno puede destacarse cuantos jóvenes aquí de La Pintana tienen títulos, son profesionales’
¿Y eso a su hijo le hace tomar una actitud más favorable con el estudio?

- Eh, no se si sería por eso pero si el Esteban es bien (…) si le piden material 'no mamá, yo tengo que llevarlo' o 'mamá, tengo tarea' o 'mamá, enséñeme esto' no se 'mamá, no sé dividir' me dijo la otra vez, Esteban yo no me acuerdo, si realmente yo no se a veces dividir, ni restar, si de repente no le pego mucho (risas) sin mentirle, pa que le voy a decir (…) pero el papá le pega entonces el Esteban estuvo toda una tarde ahí, el Marcos enseñándole a dividir hasta que aprendió. Incluso en una oportunidad la profesora le dijo 'Esteban, y como sabi dividir si no te he pasado las divisiones?' 'no, es que mi papá melas pasó'

¿Ud. qué sospecha que el niño ha aprendido en el colegio?

- Bien, le pega bien al lenguaje, a la comprensión del medio también, el más, en matemáticas más o menos ah. En lenguaje yo lo he cachado que cacha más. En compresión del medio que le llaman, como ciencias naturales que era antes, ese ramo. El papá ahí no le pegaba mucho, le cuesta más la gramática (…)

Ud me ha hablado que prácticamente no hay incentivos para los alumnos ¿pero ha encontrado que hay algun incentivo intermedio?

- No, ella no, no he sabido de ella pero del profesor Manuel si, cuando les hace religión dice 'ya chiquillos, el que termina primero se come una sopaipilla' o el profesor Marcos cuando les hace física les dice 'el que gana la carrera le regalo una sopaipilla con un café' y se las compra po, se las paga si

¿Y los castigos?

- Igual he escuchado hartos comentarios de los mismos niños que las profesoras de aquí los tiran (patillas), de acá atrás los pescan

¿Ud. conoce o participa en los actos donde participan los alumnos?

- Siempre vengo a verlo no más po, cuando han bailao (…) vengo, si. Si porque el Esteban es como le digo, bien urgio así 'oye mamá (…) tiene que ir, tiene ir' tengo que venir 'oye mamá, la profesora dijo que tienes que ir hacer completos' y tengo que venir porque si no él se enoja. Como que me presiona, 'si ud. no va yo me enojo' y tengo que venir, él como que me presiona y a mí me somete a lo que él dice ¿me entiende?

APPENDIX 2: TEST FOR ENDOGENEITY

A.2.1 Hausman and SUEST tests

```
hausman reg1 reg2, eq(1:1)
```

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      reg1         reg2        Difference          S.E.
-------------+------------------------------------------------------------
      repite |    26.26037     24.71921        1.541157               .
      hombre |     6.52738     6.697732       -.1703519               .
   climaedh2 |    4.032485     3.187186        .8452987               .
      padres |    4.082149     3.753579        .3285703               .
    lnipcap2 |    14.77246     12.49921        2.273243               .
------------------------------------------------------------------------------
                        b = consistent under Ho and Ha; obtained from regress
          B = inconsistent under Ha, efficient under Ho; obtained from regress

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          = -1711.04    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

```
suest reg1 reg2

Simultaneous results for reg1, reg2

                                                  Number of obs   =      74441

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
reg1_mean    |
      repite |   26.26037   .5960169    44.06   0.000      25.0922    27.42854
      hombre |    6.52738    .343802    18.99   0.000     5.853541     7.20122
   climaedh2 |   4.032485   .0690657    58.39   0.000     3.897119    4.167851
      padres |   4.082149   .3844155    10.62   0.000     3.328709     4.83559
    lnipcap2 |   14.77246    .274893    53.74   0.000     14.23367    15.31124
       _cons |   186.0797   1.090012   170.71   0.000     183.9433    188.2161
-------------+----------------------------------------------------------------
reg1_lnvar   |
       _cons |   7.725462   .0049077  1574.16   0.000     7.715843    7.735081
-------------+----------------------------------------------------------------
reg2_mean    |
      repite |   24.71921   .6613603    37.38   0.000     23.42297    26.01545
      hombre |   6.697732   .3500025    19.14   0.000      6.01174    7.383724
   climaedh2 |   3.187186   .0728794    43.73   0.000     3.044345    3.330027
      padres |   3.753579   .3934517     9.54   0.000     2.982428     4.52473
    lnipcap2 |   12.49921   .2851335    43.84   0.000     11.94036    13.05806
```

```
       exppd |    17.4177   .4504903    38.66   0.000     16.53476    18.30065
       _cons |   183.8975   1.135094   162.01   0.000     181.6728    186.1223
-------------+----------------------------------------------------------------
reg2_lnvar   |
       _cons |   7.702323   .0050768  1517.16   0.000     7.692373    7.712274
------------------------------------------------------------------------------

.  test [reg1_mean=reg2_mean], common

 ( 1)  [reg1_mean]repite - [reg2_mean]repite = 0
 ( 2)  [reg1_mean]hombre - [reg2_mean]hombre = 0
 ( 3)  [reg1_mean]climaedh2 - [reg2_mean]climaedh2 = 0
 ( 4)  [reg1_mean]padres - [reg2_mean]padres = 0
 ( 5)  [reg1_mean]lnipcap2 - [reg2_mean]lnipcap2 = 0

           chi2(  5) = 1610.10
         Prob > chi2 =    0.0000
```

A.2.2 Instrumental Variables

```
pwcorr res11 materiales preg6 preg5, sig

             |    res11 materiales    preg6    preg5
-------------+------------------------------------
       res11 |   1.0000
             |
             |
  materiales |   0.0265   1.0000
             |   0.0000
             |
       preg6 |   0.0062   0.3689   1.0000
             |   0.1219   0.0000
             |
```

A.2.3 Logistic Regression

```
. logit exppd climaedh preg6

Iteration 0:   log likelihood =  -38807.74
Iteration 1:   log likelihood = -31174.887
Iteration 2:   log likelihood = -30630.224
Iteration 3:   log likelihood = -30612.707
Iteration 4:   log likelihood = -30612.679

Logistic regression                               Number of obs   =      63562
                                                  LR chi2(2)      =   16390.12
                                                  Prob > chi2     =     0.0000
Log likelihood = -30612.679                       Pseudo R2       =     0.2112

------------------------------------------------------------------------------
       exppd |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    climaedh |   .3532921   .0037684    93.75   0.000     .3459062    .3606779
       preg6 |   .1688524   .0052421    32.21   0.000      .158578    .1791267
       _cons |  -3.645885   .0418383   -87.14   0.000    -3.727887   -3.563884
------------------------------------------------------------------------------
```

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